THE ROLE OF MINING IN THE ECONOMY OF SOUTH WEST AFRICA / NAMIBIA - 1950 TO 1985 -

by

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PREFACE

While compiling the national accounts for SWA/Namibia over the past seven years my interest was drawn to the overwhelming impact mining has on the country's overall economic activity. This tempted me to make a study of the contribution of mining to the economic development of SWA/Namibia. This study was conducted during a period in which virtually no reliable data on the subject were available and it was necessary to make an intensive search for available statistics and to revise, verify and arrange them into an acceptable format. This thesis therefore contains the result of research conducted over that past five years and I hope that it may contribute towards a better understanding of the functioning of SWA/Namibia's economy and the role mining plays in this process. I also hope that the thesis may clarify some of the real economic problems facing the country and offer some suggestions to overcome them in order that the people of SWA/Namibia may enjoy the full benefit of the country's mineral resources.

This study was made possible mainly through my employment in the Economic and Financial Planning Division of the Department of Finance in Windhoek. In this respect I owe a special debt of gratitude to the Secretary for Finance, Dr. J. Jones, for the use of the department's computer and word processing facilities, and for access to official statistics. The views expressed in this thesis are, however, solely my own and not those of the Department of Finance. Nevertheless, the results of my statistical analyses presented in this thesis have been incorporated in the official national accounts of the country from time to time.

In the second instance I am grateful to the Economics Department of the University of Stellenbosch for accommodating this thesis under its supervision. I am, however, particularly indebted to my supervisor, Prof. S.A. Cloete, for his guidance and for the numerous suggestions he has made on improving the content and format of the thesis. The same applies to Prof. P.J. Mohr of the University of South Africa and to Prof. D.G. Franzsen, who gave valuable criticism on unclear argumentation in some parts of the thesis.

I am also indebted to a number of other persons and organisations who assisted me in obtaining the necessary information and statistics: the Government Mining Engineer and the Director of Geological Survey and their staff in Windhoek as well as the national accounts divisions of the Central Statistical Services and the South African Reserve Bank in Pretoria.

Last but not least, I would also like to express my sincere gratitude to my wife Rina, who gave me the necessary moral support and encouragement which enabled me, at long last, to complete this study.

P.W. HARTMANN
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GENERAL NOTES

Abbreviations:

GDP = Gross domestic product at factor cost at current prices. If it is expressed at market prices or at constant prices, this is mentioned in the text or tables. The GDP as it is presented in the thesis, does not include the non-market transactions of the subsistence and informal sectors of the economy. This fact must be kept in mind, when the GDP is used as parameter of the country's economic activity in certain sections of this thesis.

GNP = Gross national product at factor cost at current prices. If it is expressed at constant prices, this is mentioned in the text or tables.

GVA = Gross value added refers to the absolute contribution of an industry or sector to the GDP and is expressed at the same costs or prices as the GDP.

CPI = Consumer price index of Windhoek. This index, despite the fact that it pertains mainly to the higher income group of the capital, is generally accepted as being representative of the whole of SWA/Namibia.

'Fifties = The period 1950 to 1959.
'Sixties = The period 1960 to 1969.
'Seventies = The period 1970 to 1979.
'Eighties = The period 1980 to 1985.
CDM = Consolidated Diamond Mines (Proprietary) Limited.
RUL = Rössing Uranium Limited.
TCL = Tsumeb Corporation Limited.

Rounding:

Owing to the independent rounding of data in some tables, the totals may not always add up to the figures shown.

Presentation of statistical tables:

Because the data in the tables in the text and in the statistical appendix were computer processed and printed, a decimal point (.) is shown instead of a decimal comma (,), e.g. 123.4. Commas on the other hand are shown in certain tables to separate thousands, e.g. 1,000,000.

THE PURPOSE, METHOD AND SCOPE OF THE STUDY

THE PURPOSE AND NATURE OF THE STUDY

The percentage contribution of the mining sector to the GDP is frequently used to illustrate its relative importance in the economy of SWA/Namibia. The GDP, however, is only one parameter to measure its performance and its importance in relation to total economic activity. In order to establish what mining really means to the economy of SWA/Namibia, it is essential to present a study in which the impact of mining on various macro-economic and socio-economic variables in the economy is investigated.

This study is mainly concerned with economic analyses to obtain a better understanding of the advantages and the problems which mining holds out for the economy of SWA/Namibia and to suggest some policy guidelines for the elimination of the problems and for the development of a properly structured and administered mining industry in order to enjoy the full benefits of the nation's mineral resources. To be able to reach such conclusions, it is necessary to present a rather lengthy and technical macro-economic analysis of the role of mining in the economy of SWA/Namibia.

The study was undertaken during a period of renewed concern about the future of the natural resources of this country. This interest was evoked through warnings by the public regarding the consequences of the recent trends of declining mineral production. Critical views were taken on the role of multi-national corporations, especially those in the mining industry. Public pressure led to an extension of scope of the inquiries of the "Commission of Enquiry into Misappropriation of Property of Representative Authorities in, and the Central Authority of South West Africa" (the so-called "Thirion-Commission") into certain practices in the mining industry and the government's control measures over these practices. However, it is not the aim of this study to repeat the findings of the Commission or to concentrate merely on certain undesired practices of some mining companies. The main objective of this study is to provide perspective on the functioning of that part of the economic system which is based on mineral resources.

METHODOLOGY

To determine the economic significance of the exploitation of mineral resources in SWA/Namibia empirical analyses are made, which entail the establishment of statistical facts about the complex structural relationship between various economic activities of the economy. Attention is not only given to the direct impact of mining on the economy, but attempts are also made to describe the role and significance of mining in various economic spheres such as production, employment, investment, exports and prices. This is done by using a broad descriptive "model", based on the principles of national accounting and the input-output analysis.

With this model it is possible to establish structural relationships of mining with other facets of the SWA/Namibian economy through the determination of various kinds of economic multipliers. In addition, the available mineral production and national accounts data for the past three decades are summarised in order to give a complete and up-to-date description of all spheres of mining in SWA/Namibia and establish long-term trends of mining's activities and its impact on the economy. Extensive use of graphs is made throughout this study to describe these long-term trends. Technical data and calculations are contained in appendices at the end of the text, followed by a statistical appendix containing all the relevant statistics used in the study.

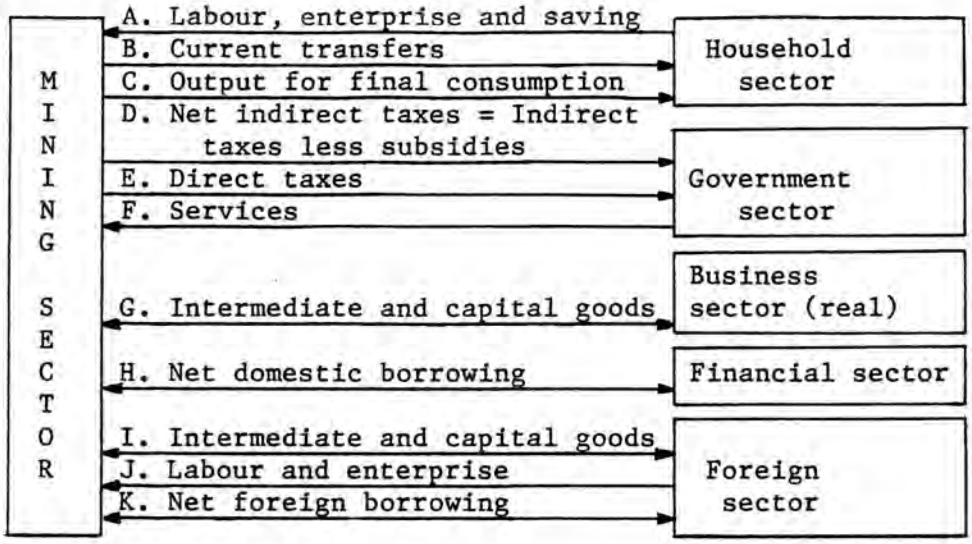
The definition of the mining industry is that used in the Standard Industrial Classification (SIC), namely the industry responsible for the extraction, dressing and beneficiation of minerals occurring naturally. The activities of the mining industry also include the primary treatment of ores, such as *inter alia* crushing, screening, washing, cleaning, grading, milling, flotation and pelleting (Central Statistical Services, undated: 43). The smelting of metal concentrates, which is strictly speaking part of the manufacturing sector according to the SIC-classification, is also included under mining for purposes of this study.

Furthermore, the mining industry is divided into diamond, uranium and other mining, where such distinctions were found necessary or possible in terms of the availability of the data. Where uranium and other mining are combined, this industry is being referred to as non-diamond mining to avoid confusion.

The nature of the external links of the mining sector and the rest of the economy is depicted in the accompanying diagram.

The mining industry on the left includes those enterprises responsible for mineral production, and the institutions with which it is linked are identified as five sectors on the right. The mining sector obtains resources from these sectors in exchange for income distributed and provides intermediate and final products in exchange for mining income receivable.

LINKS BETWEEN THE MINING SECTOR AND THE OTHER SECTORS OF THE ECONOMY



The <u>household sector</u> supplies mainly primary inputs or basic factors of production, namely labour and enterprise (in exchange for salaries and wages), but also savings (in exchange for interest and dividend claims and proprietorship). On the other hand the household sector also demands final mineral products to a small extent.

The <u>business sector</u> supplies mainly intermediate goods and services (i.e. non-factor inputs used in the mining process) and capital goods used to replace capital stock depreciated in the mining process, or to expand the mining capacity.

The <u>financial sector</u> supplies external funds for financing capital investment or it conducts financial surpluses from the mining industry to the rest of the economy.

The <u>government sector</u> generally provides the physical and social infrastructure for private enterprise, and directly represents a net claim in the form of direct and indirect taxes on the income generated in the mining sector.

The <u>foreign sector</u> represents the combined influence of all the sectors mentioned above, except that it operates from outside SWA/Namibia. Traditionally, the mining industry has maintained strong links with the rest of the world for a number of reasons. The bulk of the total output of the mining sector is exported, while capital, entrepreneurship and to a lesser extent labour, are used from the foreign sector. Owing to the still under-developed secondary industry in SWA/Namibia, most of the intermediate and capital goods are imported directly or indirectly. Funds for financing capital investment in mining also originates chiefly from the foreign sector.

THE SCOPE OF THIS STUDY

An introductory framework is presented in chapter one of this thesis. The first section of the chapter deals with the conceptual aspects of natural resources in general and of mineral resources in particular. Attention is given to the role natural resources can and should play in economic development. In the subsequent section some important policy guidelines for the proper and responsible management of a country's mineral resources are presented, which could serve as a basis for a responsible minerals policy in general and for SWA/Namibia in particular. The chapter also gives a brief situational analysis of the local economy, in which attention is given to aspects like the structure of the economy, the type of economic activity, economic growth and foreign trade. This section is intended to serve as background to the subsequent analysis of the mining industry. Finally, the accounting framework to be used in the analytical part of this study is explained.

Because the extent of mineral occurrences in the country is often either understated or overstated, it is necessary to present an objective view on these and related aspects in this study. Chapter two is therefore devoted to the physical, geographical and historical aspects of mining in SWA/Namibia. Details are given about the kind of minerals occurring in the country, where these occurrences and the productive mines are located and the industrial application of each mineral. Next, the major mineral industries in SWA/Namibia are described with special reference to their historical development, production processes and their economic viability. The volume and value of mineral production is analysed in detail for the period 1950 to 1985 in the final two sections of this chapter.

In chapters three to eleven, which represent the main analytical part of the thesis, the mining industry's activities in the principal macro-economic aggregates are examined. These aggregates are based on the following macro-economic equations:

$$Y = R + S \quad \text{and}$$
$$= C + G + I + (X - M);$$

where Y = Gross domestic product/income;
R = Remuneration of employees;
S = Gross operating surplus;
C = Private consumption expenditure;
G = Consumption expenditure by general government;
I = Gross domestic investment;

X = Export of goods and non-factor services; and
M = Import of goods and non-factor services.

Chapter three deals extensively with the contribution mining makes to domestic production. This is done by investigating not only mining's direct share in production, but also its indirect contribution to production and income generation. For this purpose an input-output table is employed to quantify the indirect relation between mining and the rest of the economy. Attention is also given to the value of real income generated by the mineral resources sector and to different statistical techniques that could be applied to express the income generated by mining. The mining industry is in a position to lead and sustain the economy in a growth period with relatively high prosperity, but because mineral trade is extremely vulnerable to extraneous circumstances and is in fact based on depleting assets, it is also necessary to investigate circumstances where mineral resources become exhausted. This investigation is done in the next section where certain circumstances are simulated to determine the economic consequences for the economy as a whole. Because the future of the mineral resources seems so vulnerable and uncertain at times, this chapter is concluded with a few suggestions on potential projects associated with the mining industry, designed to provide linkages with the other industrial sectors and to increase the local content of mineral and industrial production.

Mineral production in the modern technological era requires large sums of capital investment. For this reason it is necessary to devote a chapter to the examination of trends in capital investment or formation in the mining industry of SWA/Namibia. This is done in chapter four where capital formation in the mining industry, its relation to total capital formation in the country, to the employment in mining and to the output of mining are investigated. Here the focus also falls on the indirect effect capital formation has on income generation in the rest of the economy.

An analysis and evaluation of the combined effect of mining's direct and indirect value added in the economy as a whole follows in chapter five. All the macro-economic multiplying effects resulting from mining activities in the country are consolidated here, which should give a more comprehensive impression of the significance of mining's role as income generator in the economy.

Chapter six examines the employment function of the mining industry. Attention is given to the composition of mining's labour force and its relation with the total labour force and the economically active population. The long-term trends of the remuneration of employees and the wage-gap and their economic implications are also some of the aspects examined. An analysis is made of the employment resulting from mineral production and that resulting indirectly through mining's acquisition of intermediate inputs from other domestic industries. Finally, the question of labour productivity in mining is attended to.

Chapter seven deals with the important subject of prices and cost in mining and its relation to prices in the rest of the economy and to import prices. A comparison between input prices and mining's output prices is also an important part of this chapter. These analyses make it possible to assess the performance of mining's output prices in relation to its input prices and finally also the performance of mining's real outputs relative to its real inputs in order to determine changes in mining's productivity and its causes.

How the income generated by mining is distributed among the different economic participants in the country, depends basically on the definition used for the concept of income. In chapter eight the subject is approached from two viewpoints for further clarity on the distribution of mining income. First, the distribution of mining's net income ("profit") and, second, the distribution of total current income in mining is analysed. This analysis is made to determine whether some structural problems do exist in the distribution of mining's income and if so what the causes for such problems are.

An analysis of the financing of gross investment in mining follows in chapter nine. Here attention is given to the sources available to the mining industry to finance its gross investment. The saving in mining is also seen in relation to the saving of the economy as a whole, whereas the financial flows from the mining industry are analysed from a balance of payments point of view. In this context the balances between mining's saving and its investment is analysed to determine its net lending or borrowing position and its contribution to the balance of payments.

Mining's relation with the foreign sector is dealt with in chapter ten. Particular attention is given to the significance of mineral exports in SWA/Namibia's balance of payments. Mining's net contribution to the balance of payments is also examined by taking into account mining's factor payments as well as the imports resulting directly and indirectly from mining's acquisition of current and capital inputs. Mining's role in the country's terms of trade is investigated to establish whether in fact mining has a favourable or unfavourable influence on the terms of trade. The chapter also gives a tentative indication of the trading partners of local mineral exports.

Particular attention is given to the international influences that affect the performance of the local mining industry. These influences include the business cycles of the world economy, especially those of the Western World, the exchange rate, technological influences and international competition. Certain calculations of these influences are made to illustrate their impact on the mining industry. Because multi-national corporations play a relatively important role in the mining industry of SWA/Namibia, the final section of chapter ten gives a brief account of the advantages and disadvantages associated with multi-national corporations in general and with those in the mining industry in particular. Attention is also given to the foreign investment in the local mining industry.

A certain portion of mining's income generated in the economy through the production process is distributed to the government in the form of taxes. Mining taxation is therefore the main subject of chapter eleven which is intended to investigate the share of mining income distributed to the government in the form of taxes and secondly the contribution these taxes make to total taxes paid in the country. In another section the government's policy towards the mining industry is spelled out in which particular attention is given to the present tax regime applicable to mining companies, possible deficiencies in the present tax and minerals policy and ways to rectify some of these problems.

At the end of each chapter a summary is given of the main conclusions reached in the investigation of the different activities of the mining industry. The final chapter concludes with a review of the main findings of this study with particular reference to the policy implications of certain adverse developments in the mining industry. Possible policy guidelines and measures are suggested in the hope that these may contribute to alleviate some problem areas and to develop a properly structured mineral industry so that the nation's mineral resources can be used to the benefit of all.

CHAPTER ONE

INTRODUCTION

1.1 CONCEPTUAL BACKGROUND

Before an attempt may be made to quantify and analyse the role that mining plays in the economy of SWA/Namibia, it is necessary to present a framework by which to judge what role natural resources and more particularly mineral resources should play in economic development. Certain important policy guidelines for the management of natural resources are also spelled out. The fundamental principles serve as a frame of reference in the discussion of the different activities of the mining industry of SWA/Namibia. Finally, these principles as well as the policy guidelines are tested against actual experience in SWA/Namibia's mining industry in the concluding review.

1.1.1 THE ROLE OF NATURAL RESOURCES IN ECONOMIC DEVELOPMENT

The concept of natural resources used in this chapter is not a fixed or finite quantity or quality, but instead it is a dynamic concept, because what is considered useless at one time may become a major resource through change in technology, or in ways of living, or it may become useless in course of time owing to similar developments. It is therefore mainly an economic concept, since a potentiality of the natural world becomes a resource only when its use is profitable (Dorner, El-Shafie, 1980: 23).

The possession of natural resources is not necessary to the economic progress of a nation, but it can have a favourable influence on the level of income and its growth. In the economic sense the natural resources may be viewed as part of a country's capital stock; they are to be regarded as naturally occurring pieces of "equipment" which render productive services. Hence, the more a country has of them and the higher their quality, the better off it will be, other things being equal (Herfindahl, 1969: 4-5). The principal difficulty in achieving development in resource-rich countries is the effective management of the proceeds from sale of those resources (Kindleberger & Herrick, 1977: 71).

The fact that natural resources are naturally occurring assets and not man-made ones, is an important issue which receives much attention in the doctrine of resource economics. Apart from this issue and conservational issues, resource economics is concerned mainly with the universal question of "How long and under what conditions can human life continue on earth with finite stocks of <u>in situ</u> resources, renewable but destructible resource populations, and limited environmental systems?" (Howe, 1979: 3). The answer to this question depends basically on the degree of optimism or pessimism involved in the evaluation of future prospects. A typical pessimistic assessment of the future of natural resources is that if "... population and industrial growth continue to generate more people and a higher resource demand per capita, the system is being pushed toward its limit - the depletion of the earth's nonrenewable resources." (Meadows et al, 1975: 68). A typical optimistic view on future natural resources is that "... the fusion process should give to mankind a virtually unlimited source of industrial power, with the oceans serving as a boundless reservoir of fuel - even for a world population far larger and many times richer than today's." (Macrae, 1972: 17).

The assessment of the world's future with declining natural resources is a topical subject; and for an individual country the above hypotheses become even more critical, since the government of the day may take decisions on the use of natural resources that would affect future generations. A natural balance should therefore be found between the development obtained by the exploitation of natural resources now and the development which is foregone now through a conservative exploitation policy which reserves the resources for future generations.

With this basic principle of conservation in mind, natural resources may and should be used for the economic development of a country. The discovery, appropriation or invention of additional natural resources, which may be applied in industrial production, will increase per capita income. The extreme case is that of oil exporting countries whose average GNP per capita is higher than that of the industrial market economies, although their average level of socio-economic development is lower by far than that of the industrial market economies. This is illustrated by the accompanying indicators of a typical capital surplus oil exporter and a typical industrial market economy (World Bank, 1986: 181, 231).

	1984 GNP per capita ($)	No. enrolled in secondary schools as % of age group (1983)1\	1984 Life expectancy (years)2\	1984 Total fertility rate3\
Saudi Arabia	10 530	36	62	7,1
Japan	10 630	94	77	2,0

In the extreme case of oil exporting countries, the overwhelming role of natural resources in economic development becomes clear. There are, however, countries with minimal natural resources that have built up high income economies. Switzerland, with only hydro-electric power and the Netherlands, with little soil per capita serve as appropriate illustrations. Also in Japan and Israel that have risen so far so fast with limited natural resources, man-made resources, mainly in the qualities of the people and in the use of foreign capital inflow, have played a major role in development. These cases prove that economic development may be attained even in the absence of natural resources, but then the intensive use of labour and capital must play a critical part in the production process. Furthermore these countries, although not richly endowed with natural resources, must still ensure access to natural resources through trade with other nations with a different or better natural endowment (Hagen, 1980: 124-125). Most less developed countries (LDCs) have not reached the stage where these man-made resources may be used intensively owing to highly ethnic populations, a high percentage of the population still engaged in subsistence agriculture and an unmotivated urban population. It is for this reason that natural resources have become such critical factors in the economic development of LDCs, which are occasionally over-reliant on natural resources. This leads to over-exploitation of natural resources by overgrazing, impoverishment of agricultural soil, removal of shrub and tree cover, overfishing and overmining. It is therefore of the utmost importance that the exploitation of natural resources be combined with man-made resources such as motivated and schooled labour, entrepreneurship, capital and particularly technology.

Assuming that no technological change occurs and that it is not possible to substitute man-made resources for natural resources completely, it is possible to investigate very long-term production potentials with a finite resource stock. Howe (1979: 82-83) points out several scenarios of the use of resources under the assumptions made above:

"(a) That the resources would be used up quickly in a period of rapid growth and high living, followed by a collapse of the system because of the essential nature of the resources.
(b) That the resources would be used very slowly, resulting in low output levels and standards of living but lasting a long time.
(c) That natural resources are used rapidly to develop production capacity for renewable inputs that can then be substituted in large measure for further use of the nonrenewable natural resource, making continued production possible for a long time span.
(d) That natural resources are 'conserved' and used very slowly, only to be made obsolete by technological breakthrough.
(e) That technological change and the substitution of renewable inputs for natural resources are sufficient to keep GNP growing indefinitely, but the environmental effects become so detrimental that welfare may not be improved."

These possible consequences suggest that governments have to deal with a number of policy problems which in turn will depend on a number of characteristics of the economy, for example (a) the ease with which renewable inputs can be substituted for natural resources; (b) the strength of time preference that is applied in the decisions being made (i.e. the rate at which future exploitation of natural resources is discounted); and (c) the definition that is given to the society's and the future society's well-being (cf. Lecomber, 1979: 95-104).

1.1.2 THE ROLE OF MINERAL RESOURCES IN ECONOMIC DEVELOPMENT

Much of what has been said of the role of natural resources in economic development, generally applies to mineral resources as well, with the difference that most mineral resources are non-renewable.

The contribution of the mineral sector to civilization and material progress to individual countries is immeasurable. Some major advances in meeting human needs in the past - for food, housing, health care, education, employment and transport - have been attributable to the use of additional minerals, more efficient use of minerals, use of better mineralsor very often to a combination of all three factors (Bosson & Varon, 1984: 96-97). The existence of these resources gives rise to a major structural feature of the mineral based economies (i.e. countries whose major exports are minerals), namely, the ease with which they can raise fiscal revenue in the form of foreign exchange. This is principally for two reasons. First, unlike the agricultural primary exporters, they export products that can easily be sold even when prices rise because demand often does not fall proportionately (depending of course on the price elasticity of the demand); and second, because taxes imposed on the mining sector are fairly simple to levy and to administer (Nankani, 1980: 7).

The question still remains, however, why minerals have these peculiar qualities that non-mineral commodities do not possess. This may be ascribed to the fact that mineral based economies possess an unique structural feature in the form of a "rent", which is a surplus or yield derived from the exploitation of land (in the Ricardian sense) or in the form of a "mineral rent", which is derived from the exploitation of mineral resources. Nankani (1980: 7) defines the concept of mineral rent as "the surplus earned by factors of production - land, labour, capital - beyond what is just necessary to induce the owners of these factors to offer their services."

Although certain quantative measures such as the share of mining in GDP can either overstate or understate the contribution of the mining industry to the economic well-being of a country, it is one of the few available parameters of measuring mining's role in economic development. These measures are given in table 1.1 for selected mineral based economies together with their principal minerals and their share in total exports.

TABLE 1.1 - MINING'S CONTRIBUTION TO THE GDP AND TO EXPORTS IN SELECTED MINERAL BASED ECONOMIES

COUNTRY	MINING % CONTRIBUTION TO THE GDP (a - YEAR			MINERAL EXPORTS (a				GDP (e		
	%	YEAR		AS % OF EXPORTS -	YEAR	PRINCIPAL MINERAL	% SHARE	DOLLARS 1983		% GROWTH 1973-1983
SURINAM	19%	1979		13%	1981	Bauxite	- 13%	1,230	(a	4.5%
GHANA	1%	1977		17%	1981	Gold	- 15%	3,720		-1.3%
JORDAN	4%	1981		22%	1982	Phosphates	- 22%	3,630		11.1%
CENTRAL AFRICAN REPUBLIC	3%	1977		29%	1980	Diamonds	- 25%	600		1.0%
CAMEROON	..			33%	1980	Crude oil	- 31%	7,220		6.8% (a
MOROCCO	6%	1981		37%	1980	Phosphates	- 31%	13,300		4.7%
GUYANA	13%	1976		39%	1982	Bauxite	- 34%	482	(a	0.5%
TRINIDAD AND TOBAGO	34%	1981		43%	1981	Crude oil	- 43%	8,620		5.2%
BOLIVIA	10%	1980		46%	1982	Tin	- 33%	3,340		1.5%
PERU	9%	1981		50%	1982	Crude oil	- 16%	17,630		1.8%
TOGO	8%	1979	(b	50%	1981	Phosphates	- 50%	720		2.3%
PAPUA NEW GUINEA	9%	76/77		51%	1982	Gold	- 30%	2,360		3.8% (j
TUNISIA	13%	1981		51%	1981	Crude oil	- 51%	7,020		6.0%
LESOTHO	5%	1981	(b	55%	1980	Diamonds	- 55%	300		5.5%
EQUADOR	55%	1980		55%	1980	Crude oil	- 55%	10,700		3.4% (j
CHILE	5%	1981		56%	1980	Copper	- 46%	19,290		2.9%
BRUNEI	70%	1981		56%	1981	Crude oil	- 56%	5,970	(a	4.2%
EGYPT	15%	1979		58%	1981	Crude oil	- 54%	27,920		8.8%
ZAIRE	9%	1980		59%	1982	Copper	- 40%	5,440		-1.0%
MAURITANIA	12%	1978	(b	60%	1982	Iron ore	- 60%	700		2.5% (i
SOUTH AFRICA ..	6%	1982	(d	62%	1982	Gold	- 45%	80,850		3.1%
INDONESIA	24%	1981		63%	1981	Crude oil	- 59%	78,320		7.0%
LIBERIA	15%	1979		66%	1981	Iron ore	- 62%	980		0.2%
VENEZUELA	23%	1982		66%	1982	Crude oil	- 63%	8,170		2.5%
JAMAICA	14%	1980		67%	1982	Bauxite	- 45%	3,140		-1.7%
SIERRA LEONE ..	11%	79/80		67%	1981	Diamonds	- 59%	950		1.9%
BOTSWANA	34%	79/80	(c	68%	1982	Diamonds	- 55%	930	(a	8.5%
MEXICO	77%	1981		71%	1981	Crude oil	- 69%	145,130		5.6%
SWA/NAMIBIA ...	28%	1982	(f	76%	1982	Uranium	- 38% (g	1,572	(h	1.1% (h
ANGOLA	..			79%	1979	Crude oil	- 68%	6,000	(a	..
NIGER	9%	1977		79%	1981	Uranium	- 79%	1,340		5.2%
ALGERIA	28%	1979		82%	1980	Crude oil	- 82%	47,200		6.5%
GUINEA	..			88%	1976	Bauxite	- 57%	1,910		3.1% (i
GABON	42%	1979		93%	1979	Crude oil	- 78%	2,400	(a	3.2%
NIGERIA	24%	77/78		95%	1982	Crude oil	- 95%	64,570		1.2%
CONGO	39%	1981	(b	97%	1982	Crude oil	- 97%	2,110		7.9%
ZAMBIA	7%	1981		98%	1980	Copper	- 87%	3,350		0.2%

SOURCES: (a) The Economist (1984: 54-158).
(b) United Nations, Monthly Bulletin of Statistics. Various issues.
(c) Johnson (1981: 360).
(d) S.A. Reserve Bank, Quarterly Bulletin (September 1985: S-78) - excluding SWA.
(e) The World Bank (1985: 174-176 & 232).
(f) Table A.1. (g) Table A.6(a). (h) Table A.2.
(i) Per capita GDP growth. (j) Growth rates for periods other than for 1973-1983.

These countries' dependence on mining soon becomes evident not only in mining's contribution to their GDP, but also in mining's contribution to total merchandise exports and in the contribution of each country's most important mineral to its export earnings. The dependence of oil exporting countries on the export of crude oil is particularly noticable and in twelve of the fifteen countries shown, crude oil exports account for more than half of all exports. In many of these countries this is the only mineral produced in sufficient quantity to be able to make a meaningful impact on the economy. Some of the non-oil exporting countries also rely on a single mineral product for most of their export earnings, for example Niger on uranium and Mauritania on iron ore. These countries, however, frequently find themselves in a fairly volatile economic position owing to labile prices of and/or demand for minerals, such as copper, uranium, iron ore and recently also crude oil and diamonds; these are usually over-supplied and are mostly traded in a buyers' market. Other countries, however, have a more diversified mineral industry, the most notable of which are South Africa, SWA/Namibia and Botswana. These countries are more readily able to develop strong mineral industries, initiate large exploration and prospecting projects and to develop into attractive opportunities for foreign investors. Futhermore, the funds generated through taxation and the foreign exchange earned through mineral exports may be large enough to contribute towards social development projects or in economic sectors other than mining. It is therefore not strange that countries whose mineral exports as percentage of total exports are relatively high also show higher than average growth in their GNP, but that countries relying too heavily on one mineral alone show negative correlations with growth in GNP. This tendency appeared with both oil and non-oil exporters.

In terms of the contribution to the GDP, mining plays a considerable smaller role in most of the mineral based economies listed in table 1.1 compared to mining's contribution to exports. This is due mainly to the large agricultural sectors to be found in these countries where subsistence agricultural production is still substantial, resulting in percentually smaller contributions of commercial operations such as the mining industry.

Mining also makes a substantial contribution to large scale commercial employment in developing countries. More often this employment is usually in rural and even depressed areas, thus relieving the pressure of excess urbanisation. In some countries employment in small-scale mining represents a significant proportion of total employment. Credit must also be given to development in socio-economic fields, such as the establishment of company towns (which, despite their shortcomings, are on the whole socially beneficial) and the related upgrading of education and health; the cadre of trained workers created at considerable cost; and the establishment of economic activities which justify infrastructure development and thus contribute to the opening up of remote areas (Bosson & Varon, 1984: 97-99).

Mineral based economies, however, also share some special development problems that arise from relying on an important mining sector. These problems basically stem from three sources: their resources are depletable; the demand for minerals is often unstable in the short run; and beyond a certain level, mineral rents are difficult to exact (Nankani, 1980: 6-7). Mining also has some peculiar macro-economic effects on mineral based economies. Some of these problems are dealt with here in some detail to get a better understanding of the need for a pragmatic minerals policy and to understand similar problems experienced in the economy of SWA/Namibia.

Mineral export projects have developed into and have remained enclaves, better integrated with the outside world than with the host economies, and have allowed little backward integration. Owing to the scarcity of skilled labour, mining companies either employ capital-intensive methods of production and/or pay high wages to bid for the scarce skilled labour. These steps encourage wage increases in other sectors thus leading to a deterioration in the competitiveness of domestic industrial and agricultural products. They also tend to create a labour elite or middle class which directs industry towards the production of middle class goods; this leads to increased imports of food and other consumer goods which usually have a high import content (Bosson & Varon, 1984: 98-99).

These adverse effects resulting from mining are usually intrinsic to the mining industry and are often offset by real benefits. Where certain gross adverse effects still remain, an appropriate minerals policy combined with a development plan should be employed to force a responsive company ethic upon the mining industry (Bosson & Varon, 1984: 101-102).

To sum up, substantial benefits can accrue to a country from its mining industry, provided that an appropriate minerals policy exists and is adhered to. Under such circumstances, mining activity earns foreign exchange and produces additional revenue through taxes and royalties; it may stimulate development of depressed regions, improve the professional and technical skills of nationals, and provide the nucleus for economic and industrial development.

In the next section attention is given to some important policy guidelines for the responsible management of natural resources in general and of minerals in particular.

1.1.3 IMPORTANT POLICY GUIDELINES TOWARDS NATURAL RESOURCES

1.1.3.1 THE IMPORTANCE OF GOVERNMENT INTERVENTION IN THE MANAGEMENT OF NATURAL RESOURCES

In the previous section the role of natural resources in economic development was described briefly. The conclusion was reached that the possession of natural resources alone, accompanied with a laissez-faire approach will not guarantee development and that in order to employ natural resources in the economic development process, some form of government intervention in the management of these resources becomes imperative. In this section attention is therefore given to some guidelines for a coherent and responsible natural resources policy.

Howe (1979: 331) defines a responsible natural resources policy as a "... policy on the part of the present generation of society consist(ing) of a set of rules, inducements, and actions relating to natural resources use that are sufficient to move the economy to an efficient, indefinitely sustainable, nondeclining pattern of aggregate consumption, with no irreversible deterioration of the physical environment, and without the imposition of significantly greater risks on future generations." The question arises, however, whose aggregate consumption is being referred to: is it that of the nationals of a country at the present moment, that of future generations, or even that of the present and/or future generation of the world at large? Since the possibility of worldwide determination and co-ordination of policies seems remote, practical policy guidelines must be addressed to the national policy stance or as Dorner and El-Shafie (1980: 462) put it, "Self-help is important. Charity must begin at home." On the question of whether the present or future generation must be served by the intended policy measures, there is no clear answer. In a sense, this problem is therefore a microcosm of the international resource problem.

When devising a natural resources policy it is important to remember that policy must be more than a set of abstractions laid down in a national development plan. Policies should consist of concrete objectives, of rules and procedures for developing these objectives and of substantive acts for attaining the objectives. These objectives should be practical, possible and consistent. Substantive courses of public action, however, cannot simply be ad hoc responses to current and ever-changing issues and conflicts. A broader and more comprehensive strategy with criteria for selecting specific policies and for judging their relevance and consistency is therefore essential. A national strategy reflects the ideological position of a society about the economic, social and institutional order that it wishes to create or maintain. Strategy must incorporate those basic structural and institutional changes necessary to achieve and to support the desired national order. The policy designers and strategists must remember therefore that they deal, ultimately, with effects on real people, those living and those yet to be born (Dorner & El-Shafie, 1980: 476-477).

It is not intended to present a blueprint for a natural resources policy, for the simple reason that no country's natural resource endowment and its economic structure are identical to another and therefore no universally applicable natural resource policy can be designed. In what follows, some important guidelines are presented which should be taken into account when designing such a policy.

As a first step, it is important to identify the crucial factors controlling the future availability of natural resources. These factors may be categorised under technological factors, consumption and life-style factors, and institutional and equity factors.

The technological factors which influence the availability of natural resources are the increasing difficulty in obtaining suitable natural resources, the ability to substitute man-made or renewable inputs for exhaustible natural resource inputs, the exploitation of economics of scale, the nature of anticipated future technological changes and the higher premium that is placed on environmental protection. The availability of natural resources is also governed by the fact that there are major possibilities for substitution of less resource intensive goods and services in consumption, and changes in life-style may also have an impact on the availability of natural resources via the price mechanism. Owing to institutional and equity considerations, natural resources are not allowed to reflect their real scarcities. These circumstances are a result of the increasing legal and political constraints put by governments on the exploitation of natural resources per se and on the methods of exploitation in particular. Considerably more discoveries of natural resources could be made, but these are hampered by unstable governments and hostilities in certain regions. Moreover, in many countries governments still have little knowledge of natural resources and information about natural resource reserves is still dependent on the private sector; this makes a natural flow of international investment virtually impossible (Howe, 1979: 332-335).

The importance of policy in the management of natural resources and the factors conditioning the availability of natural resources are universal circumstances; with these as background, it is now possible to continue the discussion of guidelines for a responsible natural resources policy with specific reference to a pragmatic minerals policy.

1.1.3.2 POLICY GUIDELINES FOR MINERAL RESOURCES IN PARTICULAR

It was established in section 1.1.2 that mining brings some particular advantages to mineral economies. These advantages, however, do not come automatically, but must be accompanied by a pragmatic minerals policy. This policy is imperative in order to prevent ad hoc decisions being made and to prevent development of the mineral sector from becoming sporadic and ill-directed or at times even being forfeited by the absence of a clearly defined policy. In addition, it must be borne in mind that mineral development in any country constitutes only one element of total national development and must therefore be structured to fit into the total economic development plan and policy.

After establishing the availability of resources and factors conditioning this, it is necessary to establish the broad objectives of a mineral policy. These objectives can be categorised as follows: to ensure optimal use of available mineral resources; to earn or save foreign exchange; to create employment, often in depressed areas; to promote backward and forward linkages in order to maximise value added within the country to the extent that this is economically sound; to ensure an adequate supply of raw material inputs for industry; and to stimulate regional development, often in remote areas (Bosson & Varon, 1984: 152).

Having established these broad objectives a clear-cut decision is required about whether the mining sector should be developed in a private, public or a mixed system. The selection of one of these options, or a combination of them, should be not only a broad generalisation, but it should define the government's and the private sector's participation in individual spheres of the mining industry, such as exploration, operating and marketing. With a system based on private entrepreneurship in the mining industry, it is also necessary to give clear definitions of the terms and conditions of operating practices, employment, training, ecology, safety, fiscal or legal requirements, and land tenure under which a mining company - domestic or foreign, public or private - will be expected to function (Bosson & Varon, 1984: 153-154).

Moreover, there should be a positive attitude towards mineral exploration and associated development. A government cannot allow that the bona fides of every prospective investor to be treated with suspicion and mistrust. An unambiguous and well-publicised policy is usually enough to develop good relations between foreign investors and local inhabitants. Furthermore, such a policy also gives foreign investors a good indication of the investment climate prevailing in the country.

After attending to these broad policy guidelines, it is necessary to consider more specific policy issues for the proper management of the mineral industry. The policy on this should be set out clearly in a mining code. Some of these policy issues and appropriate measures are discussed briefly below.

(a) Policy on ownership and control of mineral resources and mineral resource industries

Domestic ownership and control of mineral resources, which is the prerogative of a country, should be expanded in order to maximise the country's share of the benefits derived from its mineral resources. The basis for such decisions, however, should be clearly defined and well-publicised.

In most countries the domanial system applies, in which mineral ownership is distinctly separated from surface ownership. In addition, the mineral ownership usually rests in the state and the minerals are mined by private concerns under licence. This obviously provides the rationale for production royalties (Bosson & Varon, 1984: 267).

Ownership of mineral resource industries, however, takes on different alternatives, ranging from full nationalisation of mines to a small minority shareholding by the state. Full state ownership theoretically allows complete state control, but it is associated with many problems. In developing countries in particular the knowledge of mining, mineral processing and marketing techniques is extremely limited and it may then be necessary to hire the know-how in the form of staff or management contracts mostly from foreign countries and at great cost. Once nationalisation, with or without compensation, has occurred, the investment climate in the country may be permanently damaged; this will discourage foreign investment in mining and even in other sectors of the economy.

A more common arrangement in Africa is for the government to hold some percentage of the equity of a mine. A 51 per cent share gives the state control and in some cases the equity is shared on a 50 or even a lower percentage basis (CIIR, 1983: 90-91). Another option is to grant the state a larger voting than a commercial share, to assure that decisions taken by the mine are in accordance with the national interest of the country as a whole. In developing countries these and other acts of government participation and expropriation, together with increasing government control over foreign resources in developing countries, led to a sharp decline in the flow of foreign direct investment during the 'seventies. By the early 'eighties, state-owned mining enterprises dominated the sector in many developing countries. During this time for example, state mining enterprises controlled nearly 65 per cent of the copper mining capacity of developing countries; multi-national mining firms controlled less than 25 per cent; and the remainder was under private domestic control (Mikesell, 1985: 50). Finally, it should be mentioned that government ownership of the mining industry does not guarantee that the mining industry will be properly structured and administered; a mining code should still be applicable to all mines, notwithstanding the extent of government ownership.

(b) Policy on an optimal rate of exploration

Policy measures should be introduced to ensure mineral conservation on the one hand while on the other hand increasing the rate of ore-body recovery where it is too low in relation to the mineral potential. Although the fiscal regime is aimed mainly at taxing the mineral rent of the mining industry, it can also have an important influence on the efficiency of the sector and the extent of resource waste. The policy on mineral taxation will be treated more intensively later in this chapter, yet some fiscal measures dealing with conservational issues can be discussed here.

Conservational measures through direct regulation and through the tax regime are necessary to ensure the efficient exploitation of a mineral deposit and to avoid overmining - a practice, which may lead to the premature abandonment of parts of the deposit. It should also be noted that overmining is not always the result of greed on part of mining companies, it may also be caused by government-induced biases. Excessive high taxes or frequent references by governments to the possibility of nationalisation may in fact aggravate the problem of overmining, depending on the profitability, the income elasticity of taxation and the extent of economies of scale in production.

Tax measures like royalties, export duties and company taxes, should all have some damping effect on the rate of ore extraction and consequently on conservation. Where these measures do not have the desired effect, direct regulation becomes inevitable. This may take the form of fixing the cut-off grade at the lowest level compatible with the economic situation, and good recovery rates in the beneficiation of ores (Bosson & Varon, 1984: 269).

Where a mineral deposit is slowly coming to its end, stricter tax and regulating measures may have little or no effect on conservation, but conversely may speed up exploitation or may lead to a premature abandonment of the mining area. In this case, a depletion allowance may be considered to serve as a deductable item for tax purposes. This allowance enables a mine to retain part of its income to replace the depleting asset by initiating exploration programmes in search of additional reserves (Bosson & Varon, 1984: 169).

The mining code should also give guidance on prospecting and mining rights. Although it is often difficult to give a clear-cut and consistent policy on aspects of this nature owing to the unique character of each individual mining deposit, it is still possible to give broad guidelines. For example, the question arises whether a mining right should be granted to the first applicant or discoverer even if his company is small and perhaps technically and financially inferior to larger concerns. Granting mining rights on a first come first served basis may lead to the fragmentation of mining areas into uneconomic small blocks, to superficial exploration, to high-grading or eye-picking or to unnecessary speculation. Practices leading in these undesirable directions may be obviated by setting minimum standards for the technical and financial background required to qualify for a mining right. These standards should not be too strict or should apply only to larger mining operations, in order to encourage small-scale prospecting and mining activities (Bosson & Varon, 1984: 266-270). Speculation in mineral grants in turn should be discouraged in order to prevent the undue change of ownership of mineral deposits which would increase the danger of double counting of capital expenditure for tax purposes. This could be done either by forbidding the sale of a mining grant in which case the grant would revert to the government if the mine has abandoned the grant. The government could also apply a capital gains tax on the seller of a mining grant (Morrisett, 1967: 299) or disqualify the purchase price of the grant for immediate or accelerated depreciation for tax purposes.

The practice of land locking whereby ore-rich areas are withdrawn from prospecting and exploitation by other interested parties may be eliminated by introducing a so-called land rental, exploration or exploitation tax (surface tax). An alternative is to set minimum standards for the exploratory work to be carried out on that prospecting or mining grant. Both measures have their draw-backs; high taxation may prompt the concessionaire to high-grade the deposit and minimum standards may encourage padding or superfluous exploration being carried out. Another variation to a flat rate surface tax is to increase the rate with the age of the concession to encourage exploration companies to conduct intensive exploration and to relinquish areas considered less promising (Bosson & Varon, 1984: 167).

Whatever measures are being considered or implemented, some or other form of undesired mining practice will always exist and instead of over-regulation or the institution of ad hoc taxes on the industry, moral persuasion based on mutual understanding between the government and the industry may be more effective for a properly structured and administered mineral industry.

(c) Policy on geological and mineral resource data

Data and research on the geology and mineral resources and potential are the life blood of a country's mineral policy. Under all circumstances the government must know what nature and mankind is doing beyond its earth's crust. A good knowledge of the geological environment of the country provides an appropriate framework for planning and policy formulation. Provision should thus be made for the procurement, maintenance and dissemination of such information. Dorner and El-Shafie (1980: 482-483) stress the importance of research on this and say "Research ... is directed towards understanding and verifying how things and events are causally related. Knowledge, the end product of research, appropriately conducted, enhances the ability to calculate and project some of the consequences of action and to associate probabilities of occurrence with these projections ... knowledge is power, and it includes the ability to use power intelligently and humanely".

Policy should define the responsibility for and the nature of research and of geological survey. In most countries responsibility for supplying basic geological data and maps is vested in the government. Possible sources of this information are from background survey work done by the government itself and from geological data obtained from surveys done by private parties on their own account or on behalf of the government. In most countries private prospectors and mining companies are obliged to surrender geological information to the government. Where this is not obligatory or where this obligation is not strictly enforced, mining companies will try to guard their knowledge of reserves and resources, technology and markets by overstressing their complexity to prevent easy intervention (Bosson & Varon, 1984: 11). Geological surveys done by the government and the processing of the information can be partially financed through a nominal survey and research levy on existing producers (Harris, 1980: 186). Good co-operation should also exist between the government agency responsible for granting prospecting and mining rights and the geological survey. Finally, the data, maps and geological information about mineral potential should then be made available to potential investors in a professional manner, for example through international geological or investment conferences or publications or through the publication of a minerals handbook.

(d) Policy on environmental protection

Mineral-processing facilities accompanied by the pollution threat are increasingly being relocated to developing countries following the implementation of rigorous environmental protection legislation in industrialised countries. While many developing countries welcome this trend, others are developing a heightened environmental awareness.

The role of research on this is also very important, firstly to assess the gravity of the threat of air and ground water pollution, secondly to devise appropriate environmental requirements that will mitigate the problem, and finally, to innovate and develop new processes and new by-product uses with some economic return (Bosson & Varon, 1984: 185).

An optimal balance should be found between attracting mineral-processing facilities to the country and imposing anti-pollution controls. The existence and detection of pollution should be met by pragmatic and scientific action and not by an overreaction leading to impractical or even untenable controls.

(e) Policy on regional development

The mining industry can to a certain degree be used as a basis for regional development, particularly in countries with wide regional disparities. Mines can often bring development to remote regions by improving the life styles of the inhabitants through the establishment of initial company towns with related amenities; these usually give rise to the development of commercial and service undertakings. The regional development of mines should be accompanied by a similar government policy to provide the necessary education and health facilities. Permanent regional development using the mineral industry as basis can only succeed if the mineral potential is of a long-term nature and/or brings with it development of secondary and tertiary industries, so that once the mineral deposit has become exhausted, the region can continue to rely on alternative industries for its survival. For these reasons regional development of this nature must be accompanied with thorough long-term research and planning to ensure success in the long run.

(f) Policy on the infrastructure

Mineral policy should provide guidelines for determining whether the responsibility for the infrastructure lies with government, the private sector, or both and it should also define the rights of mining companies to make use of the public infrastructure.

The provision of and control over the infrastructure to a mine and to related auxiliary services can be of strategic and economic importance to either the mining company or the government. When the mining companies bear the cost of building the complete infrastructure, they retain control over the facilities and may be in a better bargaining position with the government. However, the infrastructure provided by the mine is usually ad hoc, serving only mineral production.

Alternatively, the infrastructure is provided by the host country in a desire to assume more control over it, to integrate it firmly into other sectors and to increase the government's leverage and share of the benefits flowing from the mining venture (Bosson & Varon, 1984: 38-39).

Infrastructural development may also serve as incentive for exploration in remote areas which have lacked mineral development owing to the non-existence of the initial basic facilities such as roads and water supply. However, the cost of infrastructural development still remains a major obstacle in many developing countries with a low degree of infrastructural development. Kursten (1983: 78) suggests that these countries should look for minerals or metals of high specific value and low treatment requirements like gold, tin, rare earths and high-quality industrial minerals with a high market value that require less transport and energy intensive infrastructures.

(g) Policy on training and employment of indigenous personnel

Although training of technical mining personnel is in the first place the responsibility of the government, the expertise and the facilities of the mining industry may be used for this. To ensure better use of the funds, training should be structured in such a way as to serve the long-term need of the sector rather than the immediate project requirements.

Training programmes should be devised in such a way as to provide for, first, formal on-the-job training of non-skilled and skilled personnel, and second, informal training in mining methods, management techniques and planning functions for small-scale mining purposes, and finally, advanced training centred on mineral exploration techniques taught at the postgraduate level combined with practical field work in the physical, geological and metallogenic environment of the students' home environment (Bosson & Varon, 1984: 208).

(h) Policy on providing host nations with an equitable share of revenue from mineral resources

The division of benefits between the host nation and the mining industry and the fiscal arrangements made about this depend on the relative bargaining power of the two parties. The size of benefits accruing to the state in turn depends on the willingness and ability of the government to tax or otherwise mobilise part of the income originating in mining (Nankani, 1980: 9).

When fiscal arrangements are being negotiated it is imperative that the host nation has at its disposal all the relevant information of inter alia the reserves, the ore grade, the market conditions and world prices of the particular mineral, investment requirements and accounting practices. Many developing countries use special consultants equipped for the task of negotiating with mining companies and in particular with multi-national mining companies. Mining companies, as opposed to manufacturing or trading companies, have considerable leeway over the size of depreciation allowances; over the option of either expensing or capitalising exploration and development expenditures; the price used to value the production (Bosson & Varon, 1984: 141); and over the extent of inter-company transfers, which may be used to manipulate taxes. It is important for the host government to recognise these potential tax avoidance "tools" and devise an appropriate tax system and associated control measures to combat and control these practices.

Although the fiscal regime of the mineral resource industry is also designed to ensure an optimal level of mineral exploitation, its principal objective is to define the resource or mineral rent of the industry and to tax it accordingly. Because of the comprehensive nature of this subject it is only possible to cover the salient features of the principles of mineral resource taxation through the discussion of three approaches of mining tax measures.

Many developing countries have opted for nationalisation of or increased government ownership in the mining industry to capture the mineral rent of the industry. The adverse effects that these steps bring with them have already been discussed. In principle, the objective of mineral economies is to establish a stable fiscal framework and to maximise, in the long run, the appropriation of the mineral rent while allowing the investor to earn the return necessary to induce him to invest. In practice, balancing these objectives is extremely difficult to achieve. Firstly, it is difficult to identify and define mineral rents owing to imperfect markets which may lead to price distortions. In addition, developing countries have limited knowledge of the mining industry and of mineral reserves and therefore find it difficult to evaluate the investors' perceptions of risks. Furthermore, future mineral prices and technologies are always uncertain. Secondly, difficulties also exist in choosing the optimum rate of mineral exploration and exploitation, and how these should be conducted in a given institutional environment (Nankani, 1980: 9-10).

The resource rent may roughly be defined as the profits remaining after deducting the company income that corresponds to the minimum return necessary to attract investment to new projects. This is essentially the sales value of the property rights of the mineral deposit. The government, as owner of mineral rights in developing countries, can exact payments from the investor in excess of normal taxes in return for the right to mine (Palmer, 1980: 518).

Owing to the high cost of exploration and the unusually high geological risk as well as some degree of "normal" commercial and sometimes also political risk, the mineral investor can insist on knowing the policy on fiscal arrangements that will apply in the event of a commercial discovery before exploration is far advanced. Before exploration it is impossible to know the value of the mineral deposit and hence what the appropriate rent charges will be. Inevitably, ex ante fiscal terms based on a fixed share of output and profits will prove later to be either too severe or too generous. Under these uncertain conditions it is difficult to propose a tax system applying to all mineral resource ventures. Palmer (1980: 521) suggests, however, that an equitable and efficient mineral tax regime should meet the following requirements:

The investor's expected tax liability in the event of commercial exploitation should as far as possible be predetermined before exploration.

Actual tax liability should be based on revealed ex post profitablity to avoid the tensions arising from inaccurate ex ante forecasts.

Actual tax liability over the project's life should be no higher than it is for non-mining projects where it turns out to be marginal or worse.

Actual tax liability over the project's life should automatically capture for the government a high share of the resource rent.

The tax structure should minimise distortions in the allocation of resources and preserve incentives for managerial efficiency.

With these requirements as guidelines, a number of alternative fiscal schemes may be considered briefly.

Corporate income tax usually charged on net profit, is sufficient to assess normal operating income, but is ineffective to capture the economic rent of mineral industries. The corporate tax scheme may contain "special provisions" designed to discriminate between industries by varying the effective rate of corporate tax. Among these provisions are accelerated depreciation allowances, immediate capital write-off, carry-forward of losses and depletion allowances (Emerson, 1980: 127). This tax scheme alone is not sufficient for the mineral industry, but is suited for combination with other tax schemes and with tax incentives. These incentives should be designed with care in order to avoid mining companies from manipulating or abusing these measures. Corporate income tax has the draw-back that it is a predetermined fixed share of profits, and may, if based on inaccurate *ex ante* forecasts, lead to significant rents accruing to the company if the rate is set too low or to a premature abandonment of the deposit if the rate is too high.

A *royalty* or *severence tax* is usually applied as an *ad valorem* charge and is probably the easiest tax to administer; hence its popularity among taxing authorities. According to Roberts (1967: 199), certain developing countries impose royalties on all mining ventures - even small, non-profitable mines - because, it is argued, if a mine cannot remain profitable, the minerals should remain unexploited to await better market or technological conditions. In most cases the royalty is based on physical volumes of production, but a value and profit related basis is being used increasingly. Each basis has its advantages and disadvantages. Profit-related royalties are according to Harris (1980: 185) less distorting than ones based on production. Palmer (1980: 538) warns, however, that the danger of transfer pricing becomes greater with any shift from production-based royalties to profit-based royalties or taxes. It may be accepted that royalties have the characteristic of capturing some or all of the mineral rent depending on the rate and basis of the royalty.

The *resource rent tax* is mainly aimed at taxing the resource or mineral rent in the resources industry. The concept of mineral rent has already been defined in section 1.1.2. Virmani (1985: 19) suggests that if the value of resource rents were known with certainty, these rents could in principle be calculated and appropriated by the resource owner, i.e. the government, by applying a 100 per cent tax, without affecting efficiency of resource extraction. In practice, however, the value of resource rent is difficult to determine, owing to varying degrees of geological and economic risks involved in each resource venture. The resource rent tax is mainly applied as a profit tax that begins to be collected when a certain threshold internal rate of return on total cash flow has been realised (Garnaut & Clunies Ross, 1975: 277). There is a tax-free period until the threshold return or the so-called hurdle rate has been earned, with a high proportional tax rate being applied to all net cash flows in excess of this return. Emerson (1980: 132) suggests that the resource rent tax is designed to tax only economic rent, which means that this tax system should be combined with conventional profits tax to assess the "ordinary" commercial income after the economic rent has been appropriately taxed. Many different forms of resource rent taxes may be designed in hybrid form and combined with other tax and incentive measures. The rate may take the form of a flat, a progressive or a tapered (i.e. gradually diminishing) rate depending on the particular conditions of the mining deposit and the amount of risk involved in the venture as well as some secondary considerations such as the existence of wild price fluctuations and the possibility of secondary recovery facilities acquired after the initial tax system has been devised.

These three tax schemes are by no means the only possibilities, but they represent three basic approaches on which an equitable and efficient mineral resource tax system may be based. Virmani (1985) illustrates by means of simulation exercises how each tax-contract system fares to obtain the optimum of the rent element of the resource under conditions of resource uncertainty. He uses inter alia the following tax systems: resource rent tax, income tax, production and profit sharing and royalty or severence tax. The taxation of the mineral rent is equitable in principle, but the size of this contribution depends in practice on the bargaining power of the state vis-a-vis the mining industry which in turn depends on the political influence and knowledge of the fisc. The knowledge of the tax authorities should be widened by continued research on different tax-contract systems available by testing these to actual information of existing resource industries through similar simulation exercises done by Virmani as was noticed above.

(i) Policy on providing linkages between mining and the rest of the economy

Earlier in this chapter it was mentioned that mineral development should fit into the total economic development plan and policy. The development policy of the mineral resource industry should therefore not provide for a mere sectorial development, but it should also provide for strategies which describe the relation of mining's proposed development with that of the other sectors of the economy.

Such a development policy is particularly pressing in the light of the fact that mineral resources are depletable and that mineral exporting countries tend to be less diversified and hence more vulnerable. A country so dependent on a single sector faces serious challenges in devising long-term policies to diversify the economy and broaden the tax base.

The main emphasis of such a policy is to break away from the enclave characteristic of the mining industry and to provide mining with linkages with the rest of the economy. The long-term objective should be for mining to provide inputs into the economy, thereby stimulating forward integration into the fabricating process and backward integration into service and manufacturing industries. The development of such linkages depends on the economic viability of secondary industries, but also on the power of the government to persuade mining industries to consider forward and backward integration. Gürsten (1974: 326) even goes so far as to say that linkages with secondary industries should be enforced upon primary industries.

The importance of forward integration of mineral industries into mineral processing industries is illustrated by Varon (1975: 20) as follows: "High profits come from processing, since value can be increased by as much as four times through semiprocessing and by as much as 20 times through full processing up to the metal bar stage."

The success of such linkages is determined in large measure by domestic demand, the availability of domestic capital and know-how, and corporate policies (Freyman, 1974: 22) as well as the competitiveness of such industries with industrialised producers and the extent of protectionist practices in consuming countries (Bosson & Varon, 1984: 89).

1.1.3.3 CONCLUSION

The policy issues discussed above, are intended to serve as guidelines for a pragmatic minerals policy. It must again be emphasized that these guidelines to be included in a mining code are not suitable for all countries. In each case the code has to be constructed in relation to the country's economic and political system. Also, the code has to be flexible and dynamic enough to adjust to changes in the economic and political situation, but these adjustments should not be carried to the extreme. It must remain reasonably consistent (particularly with regard to the fiscal arrangements) if it is to instil confidence in the investor (Bosson & Varon, 1984: 166).

1.2 SWA/NAMIBIA: THE ECONOMIC BACKGROUND

In order to describe the role mining plays in the economy of SWA/Namibia, it is essential to make a brief situational analysis of the country's economy. The main emphasis is on the structure of the economy, the composition of the GDP, economic growth, population growth and foreign trade. In each section the economic problems of SWA/Namibia are pointed out which should serve as background to the subsequent analysis of the mining industry.

1.2.1 THE STRUCTURE OF THE ECONOMY

1.2.1.1 A DUALISTIC ECONOMY

The most outstanding feature of the economy of SWA/Namibia is its dualistic nature; the coexistence on the one hand of a subsistence sector employing traditional and, by the standards of industrialised countries, primitive methods of agriculture and food supply, and on the other hand, a modern sector using advanced techniques of production in commercial agriculture, mining and all the secondary and tertiary industries. However, economic development in the country has reached a stage where the subsistence economy is exposed to a larger degree to the cash economy and its demonstration effect, so that the gap between these two sectors is slowly closing. The present efforts to improve the social, infrastructural and economic services in the former subsistence areas, as well as the active promotion of the informal sector have contributed much to the gradual shift from a subsistence to a cash economy.

1.2.1.2 A FREE-ENTERPRISE ECONOMY

SWA/Namibia is further characterised by its free-enterprise economy. Traditionally, the authorities in the country have adhered to the conventional functions of government, i.e. providing collective goods and services such as health, welfare, education and the maintenance of law and order. Public business enterprises operating in the country are only those which were previously operated by South Africa. Public corporations were non-existent until the late 'sixties and were then introduced only in cases where this was of strategic importance (e.g. electricity supply), or where this was for general development (e.g. development and housing corporations).

The private sector is free therefore to exploit all other business opportunities with relatively little competition from the public sector. Furthermore, the infrastructure created by the public authorities was aimed to a great extent at facilitating and enhancing the private production processes, through the provision of road and rail links and water and electricity supply. Most tax rates in SWA/Namibia are kept lower than those applying in South Africa and in addition, special tax incentives are applied to attract investment and particularly foreign investment. Very little control over the private production processes is exercised by the authorities and government participation in private business is virtually non-existent. An environment has thus been created for private enterprise to flourish.

1.2.1.3 AN OPEN ECONOMY

Traditionally, SWA/Namibia has had a highly open economy, i.e. a large proportion of its output is exported, whereas most of the input is imported.

For the period 1976 to 1985 the country exported on average about 62 per cent of its GDP, whereas about 63 per cent of the gross domestic expenditure was for imported goods and services (Department of Finance, 1986a: 19). Another interesting structural feature of the SWA/Namibian economy is the small role South Africa plays as trading partner for SWA/Namibian exports, whereas the bulk of the imports originate from South Africa. During 1982 for example, only 24 per cent of SWA/Namibia's exports were destined for South Africa, although about 95 per cent of all imports came from South Africa (Hartmann, 1982: 51).

With such an open economy which is geared to exports for domestic growth and with an almost equal amount of imports, the country is extremely vulnerable to fluctuations in the world economy, to price changes in its export commodities and to exchange rate influences.

1.2.1.4 A PREDOMINANT PRIMARY SECTOR

Another structural feature of the economy is the primary sector's predominance in total economic activity.

The primary sector adds on average about 46 per cent to the GDP and is responsible for about 91 per cent of total merchandise exports (see tables A.1 and A.6 respectively). With this strong primary sector, SWA/Namibia has an ideal opportunity to develop its secondary industries. The reason why this development did not materialise is that raw materials are exploited and exported in a relatively unprocessed state to countries which are closely associated with the primary sector. South Africa has close links with the local agricultural sector and many local mining companies are foreign owned by multinational corporations.

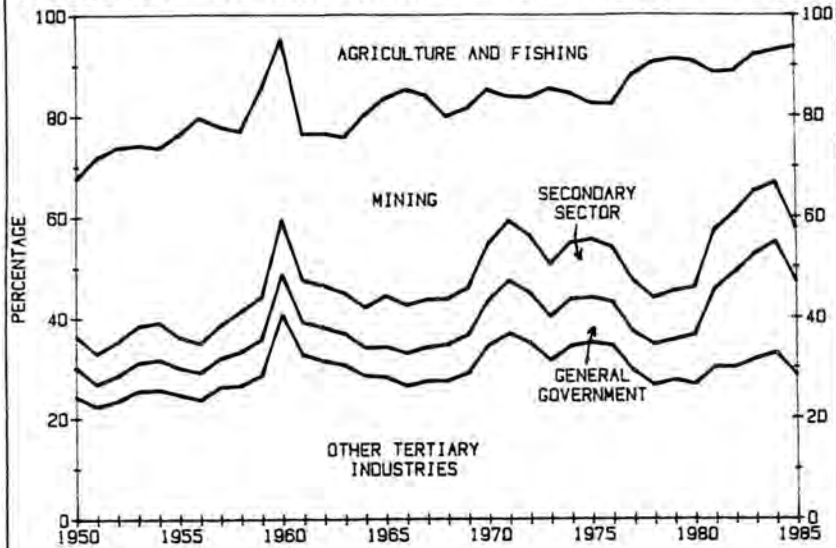
At present, however, the agricultural and mining sectors are highly dependent on export markets. The mining sector's performance is influenced by international commodity prices, which in turn reflect the international business cycles. The agricultural sector on the other hand is affected not only by the business cycle of its trading partners (in this case mainly South Africa), but also by climatic conditions in the main agricultural regions.

1.2.2 <u>THE GDP BY TYPE OF ECONOMIC ACTIVITY</u>

The structural changes in the economy of SWA/Namibia can be identified by dividing the total GDP into different sectors and by analysing the change in their contribution over a period of time. This is illustrated in figure 1.1, which depicts the percentage contribution to the GDP by the major sectors of the economy.

The role of the primary sector as producer in the SWA/Namibian economy becomes evident. In addition, the declining share of the agricultural sector and the increasing contribution by other secondary and tertiary industries shows the unfolding of a typical developing country, especially if the increasing role of the government is taken into consideration.

FIGURE 1.1 - COMPOSITION OF THE GDP AT CURRENT PRICES



SOURCE: TABLE A.1

1.2.3 ECONOMIC GROWTH

Economic growth after the Second World War can be divided into three phases, viz. 1946 to 1957, 1958 to 1970 and 1971 to 1985. The average growth declined from 13,4 per cent in the first phase to 6,4 per cent in the second and to 0,3 per cent in the third phase. Real annual growth rates of more than 15 per cent were not uncommon during the 1946 to 1957 period, and the highest annual growth rate during the period 1971 to 1985 was 9,3 per cent. The high real growth during the 'fifties and the 'sixties may be ascribed to the fast exploitation of the natural resources of the country and the buoyancy of the world economy at that stage. The decrease in real growth since the 'seventies resembles the experience of the rest of the Western World.

Figure 1.2 portrays the real GDP and the long-term trends during the three phases identified, as well as the percentage deviation of the actual real GDP from the various trends. This makes it possible to roughly identify the upward and downward phases in the economy during the post-war period reflected in table 1.2.

However, it should be pointed out that not all of these upward and downward phases reflect the natural cyclical pattern of the economy; they also include the effects of structural and other extraneous forces (e.g. periodic droughts, large autonomous fixed investments in projects like the Ruacana hydro-electric power station or the Rössing uranium mine).

Notwithstanding this qualification, it is striking that the fairly smooth and cyclic up- and downward phases during the 'fifties and 'sixties, have changed to phases of relatively short frequencies during the 'seventies and early 'eighties, sometimes not even corres-

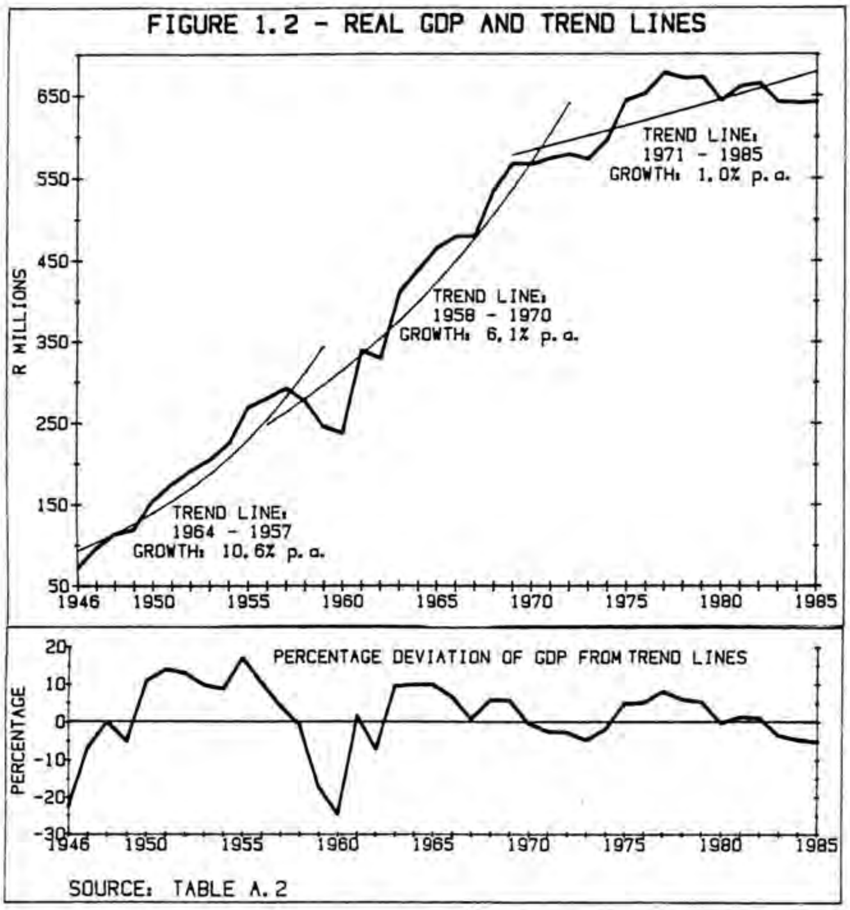


TABLE 1.2 - BUSINESS CYCLES OF THE ECONOMY OF SWA/NAMIBIA			
UPWARD PHASE		DOWNWARD PHASE	
PERIOD	DURATION	PERIOD	DURATION
1946 to 1948	2 Years	1948 to 1949	1 Year
1949 to 1951	2 Years	1951 to 1954	3 Years
1954 to 1955	1 Year	1955 to 1959	4 Years
1959 to 1961	2 Years	1961 to 1962	1 Year
1962 to 1965	3 Years	1965 to 1967	2 Years
1967 to 1969	2 Years	1969 to 1973	4 Years
1973 to 1977	4 Years	1977 to 1980	3 Years
1980 to 1981	1 Year	1981 to 1985 ?	4 Years ?

SOURCE: Derived from table A.2 and figure 1.2.

ponding to cyclic movements in the world or regional economies.

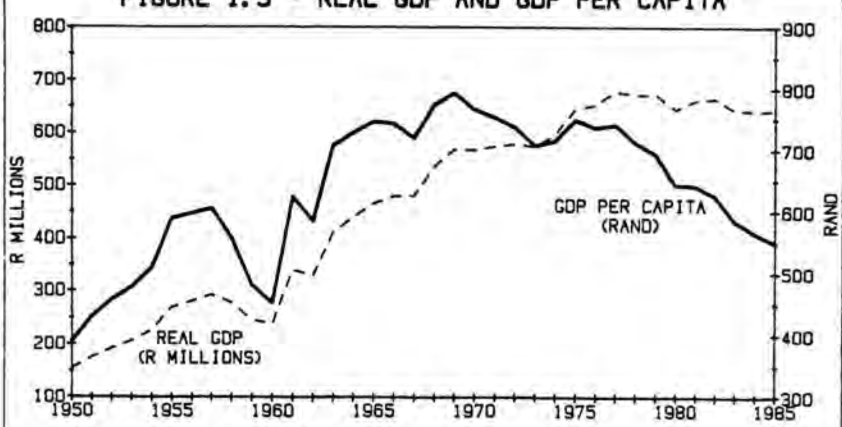
It seems, however, that these irregular cycles have come to stay. During the present economic upswing in the world economy, the SWA/ Namibian economy has gained very little in terms of increased exports, export commodity prices and production. Finally, it should be added that the political uncertainty about the future of the country is also contributing significantly to the present poor performance of the economy and the resulting high deviation from the potential long-term trend.

1.2.4 POPULATION GROWTH, URBAN CONCENTRATION AND PER CAPITA INCOME

During the post-war period the total population of SWA/Namibia grew from 407 600 in 1951 to 1 031 900 in 1981, which represents an annual growth rate of 3,14 per cent. Urbanisation, does not seem to be a critical problem judging from the population that lived in centres with more than 5000 inhabitants during 1981 compared with the population in these centres during 1970. During 1981 the total population living in these centres constituted about 17,2 per cent of the total population whereas the percentage of the total population in these centres amounted to 16,0 per cent during 1970 (cf. table A.4). It seems, however, that a slight shift from smaller centres to larger towns and particularly to the capital has taken place during this eleven year period.

Per capita income measured by the GDP (at current prices) per head of the population amounted to R139 in 1950 and to R2148 in 1985 and measured at constant 1975 prices the respective amounts are R389 and R550. Figure 1.3 depicts the real GDP (on the lefthand scale) and the average annual per capita real GDP (on the righthand scale) between 1950 and 1985. Both the fast population increase and the slow economic progress, particularly since the 'seventies were the factors responsible for the steady declining real GDP per capita and thus the general standard of living.

FIGURE 1.3 - REAL GDP AND GDP PER CAPITA



SOURCE: TABLE A.3

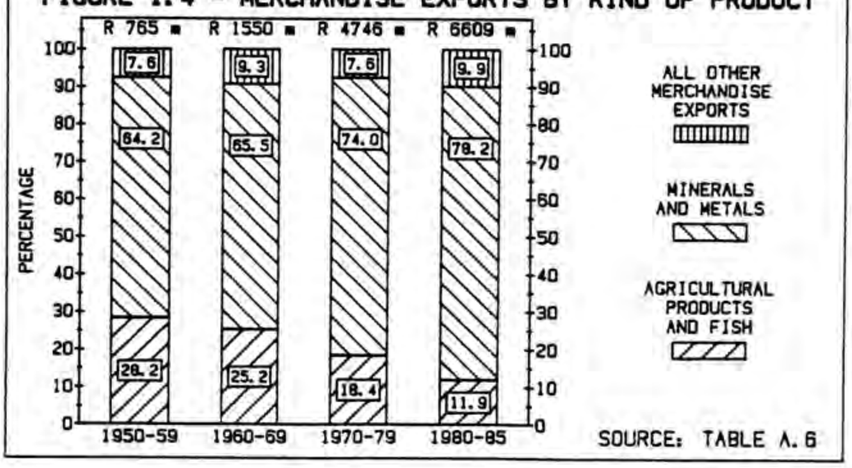
In a dualistic economy like that of SWA/Namibia, income tends to be distributed unequally among the different socio-economic groups of the country. Von Kleist (1986: 162) estimates that during 1981 the ratio of the average income of urban black and white males is about 1:7. Even worse inequality with a ratio of 1:17 is present in modern agriculture. Von Kleist (1986: 225) further notes that with increased educational qualifications among blacks (up to Std. 6) the income distribution ratio is reduced to about 1:2. It seems therefore that the redistribution of opportunities, particularly in the fields of education and training as well as economic growth, combined with industrial development are necessary prerequisites for a more equal income distribution in SWA/Namibia.

1.2.5 FOREIGN TRADE

Mention has been made of the openness of the SWA/Namibian economy. In this section the extent of the foreign trade will be discussed briefly.

Traditionally, SWA/Namibia's exports consist mainly of primary merchandise, i.e. agricultural produce and minerals and to a smaller extent of primary goods having been treated by secondary industries, e.g. processed meat and fish and refined minerals. Figure 1.4 indicates the overwhelming importance of agriculture and mineral exports in the total merchandise exports of SWA/Namibia's economy. Imports on the other hand are mainly manufactured goods, the bulk of which consist of consumer durables and semi-durables, machinery and equipment, chemicals, fuels and building materials. Most of the primary sector's capital and intermediate goods are imported, which means that imports and exports follow corresponding trends, implying that merchandise exports require a more or less proportional volume of imports.

FIGURE 1.4 - MERCHANDISE EXPORTS BY KIND OF PRODUCT



The question may arise whether the economy of SWA/Namibia is opening further, or whether some form of industrialisation has taken place. To test this hypothesis the various ratios of imports to domestic expenditure (import propensity) and exports to domestic production (export propensity) will have to be examined for a period of time; these ratios are given in table 1.3.

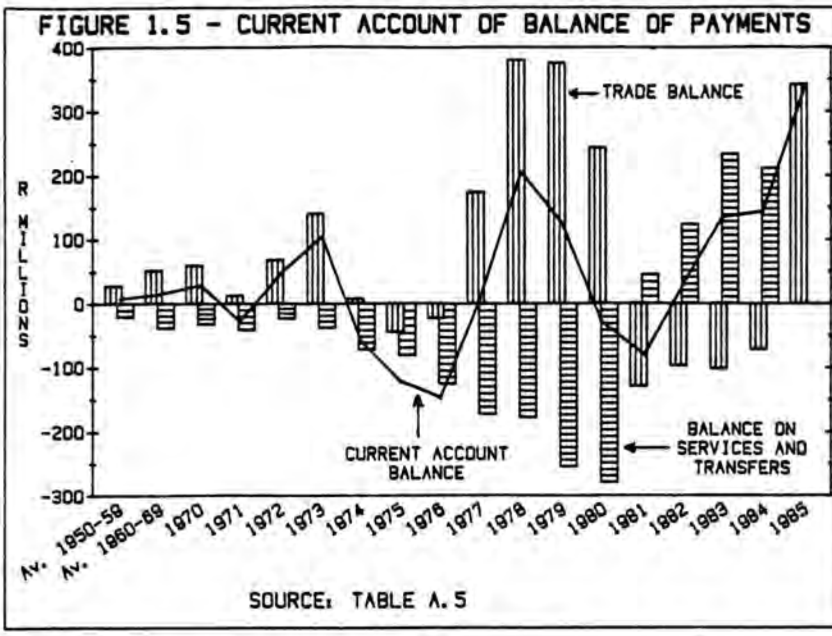
TABLE 1.3 - AVERAGE IMPORT AND EXPORT PROPENSITY		
PERIOD	% IMPORT PROPEN-SITY (a	% EXPORT PROPEN-SITY (b
1950 to 1959	67.4	73.9
1960 to 1969	60.2	65.8
1970 to 1979	61.8	63.8
1980 to 1985	62.2	59.0

a) Imports of goods and non-factor services divided by gross domestic expenditure.
b) Exports of goods and non-factor services gross domestic product at market prices.
SOURCE: Department of Finance, (1986a: 19) and unpublished data from the Department of Finance.

Although the average export propensity during the early 'eighties has declined compared with that of the previous decades, the average import propensity has increased slightly since the 'sixties. The decreased export propensity may suggest that some form of industrialisation has taken place, but in analysing the components of the GDP, it seems more likely that the decrease in export propensity was mainly the result of proportionally larger rises in private and public consumption. On the other hand, the local processing of red meat and the refining of certain base metals may be cited here as examples of developments in the direction of industrialisation. It seems, however, that the latter developments may also have led to increased imports since most of the inputs of these industries are imported. Two other reasons for the increasing import propensity are, firstly, the higher standard of living enjoyed by a larger proportion of the population resulting in higher consumer spending and, secondly, the higher government expenditure.

Figure 1.5 shows the trade balance, the balance on services and transfers and the current account balance. The strong trade balance is an unique feature of the SWA/Namibian economy. In the 36 years depicted in the figure only six years showed negative trade balances and these occurred only during the middle 'seventies and early 'eighties and were due mainly to a sharp rise in imports, the reasons for which have already been cited above.

The energy crises resulted in sharp increases in import prices. Fortunately, however, the prices in almost all export commodities rose as well, which partly offset the sudden rise in import prices and therefore in the value of imports. However, export commodity prices did not remain stable, but began to fluctuate depending on foreign demand factors and the general economic conditions of the trading



partners. These factors were partially responsible for the sharp decline in exports since 1980.

One weak aspect in the balance of payments, however, is the balance on services and transfers. In some years this balance offset the positive trade balance, leaving a negative overall balance on the current account. The reasons for the weak balance on services and transfers of SWA/Namibia, and for many other developing economies for that matter, are the high net payments for non-factor services (insurance and transport on imported goods) as well as high net factor payments (dividend and interest payments abroad). The latter payments are due mainly to the large extent of foreign investment in domestic industries. Since 1981, however, the transfer payments by the South African government to the local government increased drastically, so much so that they offset the current service and transfer outflows. It should be stressed that "development aid" of the present magnitude cannot solve the balance of payments problems permanently. For this reason SWA/Namibia must attempt to support its trade balance by promoting exports and reducing its dependence upon imported goods and services, in order to avoid that the present cyclic balance of payments problems will develop into cronic problems in future, especially after independence.

1.3 THE ACCOUNTING FRAMEWORK

Having presented the conceptual background of this study and a situational analysis of the SWA/Namibian economy, it is necessary to give a brief introduction of the accounting framework to be used in the analytical part of this study.

The national accounts of SWA/Namibia are still in a process of further amplification and refinement, but at present they form the best possible framework in which the economic links of the mining sector may be quantified and further analysed. A series of four accounts may be used for this purpose. These are:

A. the production account;
B. the income and expenditure account;
C. the capital formation and finance account and
D. the external finance account.

Unfortunately no complete data on the latter account, i.e. the ways and means and sources of financing capital formation in the mining industry, are available.

As an introduction, the first three accounts for 1984 are subsequently described briefly. These appear in table 1.4.

TABLE 1.4 - ACCOUNTING FRAMEWORK - TOTAL MINING, 1984 - R million

ACCOUNT NO. 1: PRODUCTION ACCOUNT			
Intermediate inputs	356.9	Final output:	
Remuneration of employees	188.1	Exports	857.9
Provision for depreciation	43.6	Consumption	0.4
Net operating surplus	278.7	Change in inventories	19.1
Net indirect taxes	26.4	Intermediate output	16.3
GROSS INPUT	893.7	GROSS OUTPUT	893.7
ACCOUNT NO. 2: INCOME AND EXPENDITURE ACCOUNT			
Property income (paid):		Net operating surplus	278.7
Interest	18.2	Property income (received):	
Dividends	100.6	Interest	23.4
Rent and royalties	6.8	Dividends	2.7
Direct taxes	106.7	Rent and royalties	3.7
Current transfers to:			
Households	2.0		
Rest of world	0.1		
Corporate saving	74.1		
CURRENT DISBURSEMENTS	308.5	CURRENT INCOME	308.5
ACCOUNT NO. 3: CAPITAL FORMATION AND FINANCE ACCOUNT			
Gross fixed investment	31.9	Corporate saving	74.1
Change in inventories	19.1	Provision for depreciation	43.6
		Net lending (-)/ Net borrowing (+)	-66.7
GROSS INVESTMENT	51.0	FINANCING OF GROSS INVESTMENT	51.0

SOURCE: Tables A.15, A.46, A.48.

From the production account it is clear that during 1984 the mining sector showed an output of R893,7 million of which R857,9 million or 96 per cent was exported, R16,3 million was used as intermediate inputs in other domestic industries and only R0,4 million was destined for final consumption. The intermediate outputs of the local mining sector refer to products like lime and quarrying products used in the construction industry, unprocessed metals like lead and copper concentrates, which are refined locally by the mining industry itself, and the final consumption refers to products like marble products, semi-precious stones and table salt which are sold and consumed locally. In the production process, primary inputs (or value added) to the value of R510,4 million (or 57,1 per cent) and intermediate inputs of R356,9 million (or 39,9 per cent) were used, whereas the balance was made up by net indirect taxes. In turn, the primary inputs were made up of R188,1 million remuneration of employees, R278,7 million being the net operating surplus and R43,6 million in the form of provision for depreciation which was required to replace the fixed capital stock employed in the industry. The net operating surplus of incorporated mining enterprises now represents an income item in the income and expenditure account.

Although it gives a good idea of the sources of inputs and the application of outputs, the main aim of the production account is to measure the direct contribution of mining to the gross domestic product (GDP) of SWA/Namibia. The gross value added (GVA), or income received by factors of production employed in the country adds up to the GDP. This contribution is, in fact, identical to the cost of the primary inputs estimated above at R510,4 million, which amounts to 26 per cent of the GDP in 1984. The distribution between labour and non-labour factors of production may also be deduced from this account. In mining the labour share of the value added after providing for depreciation, amounted to 36,9 per cent compared with the 60,5 per cent for the economy as a whole during 1984 (Department of Finance, 1986a: 25). Chapter three examines the production account and related aspects in more detail.

The income and expenditure account, which is analysed in chapter eight, summarises the distribution of the net operating surplus of incorporated enterprises after the addition of income from property received from assets not directly involved in mineral production. The net operating surplus of non-incorporated enterprises is regarded as income from property received by households and is not included in this analysis. However, the income of non-incorporated enterprises involved in mining is negligible. Thus in 1984 an amount of R308,5 million (i.e. an operating surplus of R278,7 million plus R29,8 million representing income from property received) was distributed among seven specific destinations shown in the table. These seven destinations refer to payments such as dividends, interest, rent and royalties (collectively regarded as property income paid), direct taxes and transfers to households and to the rest of the world. The final destination is the balancing item between the above payments and total current income, which in national accounting terms is described as "corporate saving". The distribution of income among these seven claimants is analysed thoroughly in chapters eight and eleven.

During 1984 the largest amount of mining income, i.e. R106,7 million or 34,6 per cent was distributed to the government in the form of direct taxes, followed by dividend payments of R100,6 million (32,6 per cent) and by corporate saving of R74,1 million (24,0 per cent). The rest of the claimants made up R27,1 million or 8,8 per cent of mining income.

Savings as well as tax payments are also analysed in relation to the aggregate amounts of these items in the total economy.

The <u>capital formation and finance account</u> indicates the capital investment in the mining industry and the sources available for financing this investment. During 1984 capital formation amounted to R51,0 million (of which R31,9 million was invested in fixed capital goods). The internal sources from which this capital formation would be covered amounted to R117,7 million (i.e. mining company saving plus provision for capital replacement), which implied that in 1984 the mining industry generated far more resources than required for its own capital replacement and even capital expansion. During the past, especially during the mid-'seventies, this situation was often reversed when the mining industry required external sources to finance its capital formation.

This "surplus saving" of R66,7 million now enters the monetary banking sector where it is available for productive investment in the rest of the economy. Chapter nine gives more detail of the financing of capital formation of the mining industry and its links with the rest of the economy.

The gross financial flows resulting in the above net lending position of the mining sector (R66,7 million in 1984), may be analysed in the external finance account. In this account one should be able to see that very little of the surplus saving generated by the mining industry is invested in SWA/Namibia and that very little local capital is invested in the local mining industry. The reasons for this trend are further examined in chapters nine and ten of this study.

In addition to the analysis of these four accounts it is also necessary to further investigate the so-called <u>multiplier effects</u> resulting from the inter-industry relationships or linkages between mining and the rest of the economy. The effect of several types of linkages may be identified.

The first is the "backward linkage" which refers to the mining industry's purchases of intermediate goods and services from other industries, valued at R356,9 million during 1984. Because SWA/Namibia is not yet able to provide the bulk of these inputs, such as fuels and chemicals, the backward linkage of the mining industry in stimulating local industrial production is limited, but an attempt will nevertheless be made in chapter three to quantify these linkages and the effect they have on the production of the rest of the economy.

The second linkage effect is the so-called "forward linkage". This effect refers to the use that other local industries have for the output of the mining industry, valued at R16,3 million during 1984. Since this amount is less than two per cent of the gross output of mining the effect of this linkage is extremely restricted. The only forward linkage worth noting is the fact that certain base metals are smelted locally and that some mineral outputs serve the uranium mining industry, but these intermediate outputs are covered in the discussion of the backward linkage. In this study an attempt will also be made to illustrate the potential production that could be obtained if certain mining projects and related industries were to be introduced.

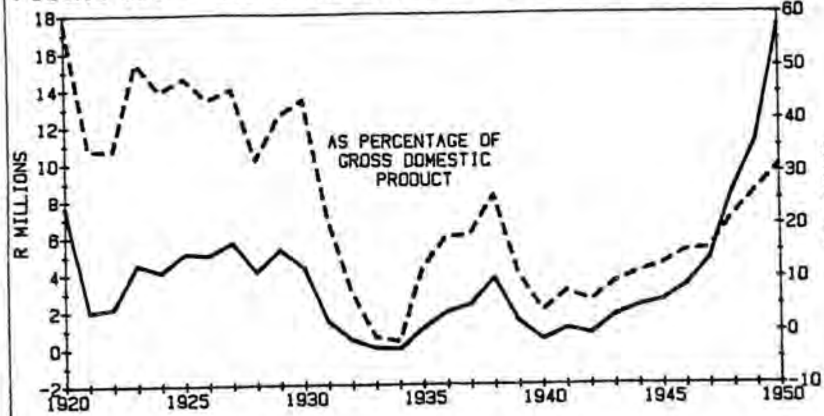
The third linkage arises from the expenditure by different participants in the economic system. These participants, macro-economically speaking, are households, the government and investors. The final outputs generated by mining enter the economy and "spark off" increases in the level of spending through private and government consumption and through capital formation. The estimate of the change in the spending level resulting from a change in mining's income generation is called the expenditure multiplier, which is examined in chapter five.

1.4 HISTORICAL TRENDS OF MINING IN SWA/NAMIBIA

Because this thesis is mainly concerned with the period since 1950, it is appropriate to give an introductory description of the trends of mining prior to 1950. In this section the role of mining in the economy of SWA/Namibia during the period 1920 to 1949 is analysed using the parameters of contributions to the GDP and to merchandise exports. Figures 1.7 and 1.8 illustrate these shares for the mentioned period.

Two distinct trends may be deduced from the figures. The first is that mining initially showed a large contribution to both the GDP and to exports, but this contribution began to decline in later years, owing to the fact that the agricultural sector and other secondary and tertiary industries began developing into commercial industries,

FIGURE 1.6 - GROSS VALUE ADDED IN MINING, 1920 TO 1950



SOURCE: TABLE A.58

FIGURE 1.7 - MINING'S SHARE IN TOTAL MERCHANDISE EXPORTS, 1920 TO 1950

SOURCE: TABLE A.59

whereas mining was already a developed industry. Secondly, the mining industry is particularly susceptible to major depressions - compare for example the Great Depression 1929 to 1933, and to international incidents like the Second World War, 1939 to 1945. It is also interesting to note that during the Great Depression the value added in mining was in fact negative, which means that operating results of the mining industry were affected to such an extent that value was deducted from the economy rather than added. This was done to keep some of the mines operative despite the adverse economic situation - a practice that would scarcely be repeated in similar circumstances today!

Having presented the conceptual background of this study, a situational analysis of the economy in general and the accounting framework upon which the analytical part of this study will be based, it is now possible to continue with a more detailed discussion of the mining industry in SWA/Namibia in which attention will be given to the physical, geographic and historical aspects of mining.

NOTES:

1. The number enrolled in secondary school refers to estimates of total, male and female enrollment of students in secondary school, expressed as percentage of the total population of secondary-school age, which is generally considered to be 12 to 17 years (World Bank, 1986: 253).

2. Life expectancy (at birth) indicates the number of years newborn children would live if subject to the mortality risks prevailing for the cross-section of population at the time of their birth (World Bank, 1986: 253).

3. Total fertility rate indicates the number of children that would be born per woman if she were to live to the end of her childbearing years and bear children at each age in accordance with prevailing age-specific fertility rates (World Bank, 1986: 253).

CHAPTER TWO

MINERALS, MINES AND MINERAL PRODUCTION

This chapter is informative rather than analytical in nature and is devoted to the physical, geographical and historical aspects of mining in SWA/Namibia. Attention first falls on the type of minerals occurring in the country, their chemical formulae, the location of major deposits and their industrial uses and applications. Next, the minerals occurring in the country are indicated on a series of maps. In the third section the volume of mineral production is depicted on maps for different time periods, in order to get an impression of the geographical distribution of mineral production and the changes that have taken place. In the fourth section the major mineral industries in SWA/Namibia are described with special reference to their historical development, production processes and their economic viability. The volume of mineral production is analysed in detail for the period 1950 to 1985 in the fifth section and the final section deals with the value of mineral production.

2.1 THE MINERALS OF SWA/NAMIBIA

In this section the types of minerals that occur in the country are briefly dealt with in accordance with the information contained in appendix one, which gives details of these minerals, their chemical formulae, the location of major occurrences and their applications, industrial uses and their products.

The list contains 92 different mineral groups or species mined and/or found in SWA/Namibia. This list of minerals is by no means complete. For example the minerals mined at the Tsumeb mine are represented in the appendix by only nine minerals, whereas the different mineral species occurring at that mine amount to several hundreds. (See Wilson [1977] for a detailed description of the world famous Tsumeb minerals.) In addition, the minerals presented in the appendix are listed to indicate their diversity and not necessarily that they occur in economic quantities.

Of the minerals contained in the list, some are extremely toxic (arsenic), some are edible (table salt), some are of great economic importance to the country and to industrialised counties and others are of value only to collectors. The diversity of the minerals also applies to some of their industrial uses: some are used in the aerospace technology and others merely serve as tombstones.

Despite the vast diversity of minerals, some of which are of strategic importance to the industrial countries, only a few of them have been and continue to be mined economically and uninterruptedly, as will be seen later in this chapter. Local mineral resources still have good potential, but there is an international tendency to exaggerate the wealth of SWA/Namibia's mineral resources presumably with political motives. As recently as May 1985 a working paper of the United Nations (1985: 5 & 7) mentioned that such valuable minerals as platinum and aluminium occur in the country, which unfortunately is not the case according to official records. It is thus advocated that the question of mineral potential of SWA/Namibia be approached with scientific accuracy based on sound economic and geological principles.

2.2 MINERAL OCCURRENCES IN SWA/NAMIBIA

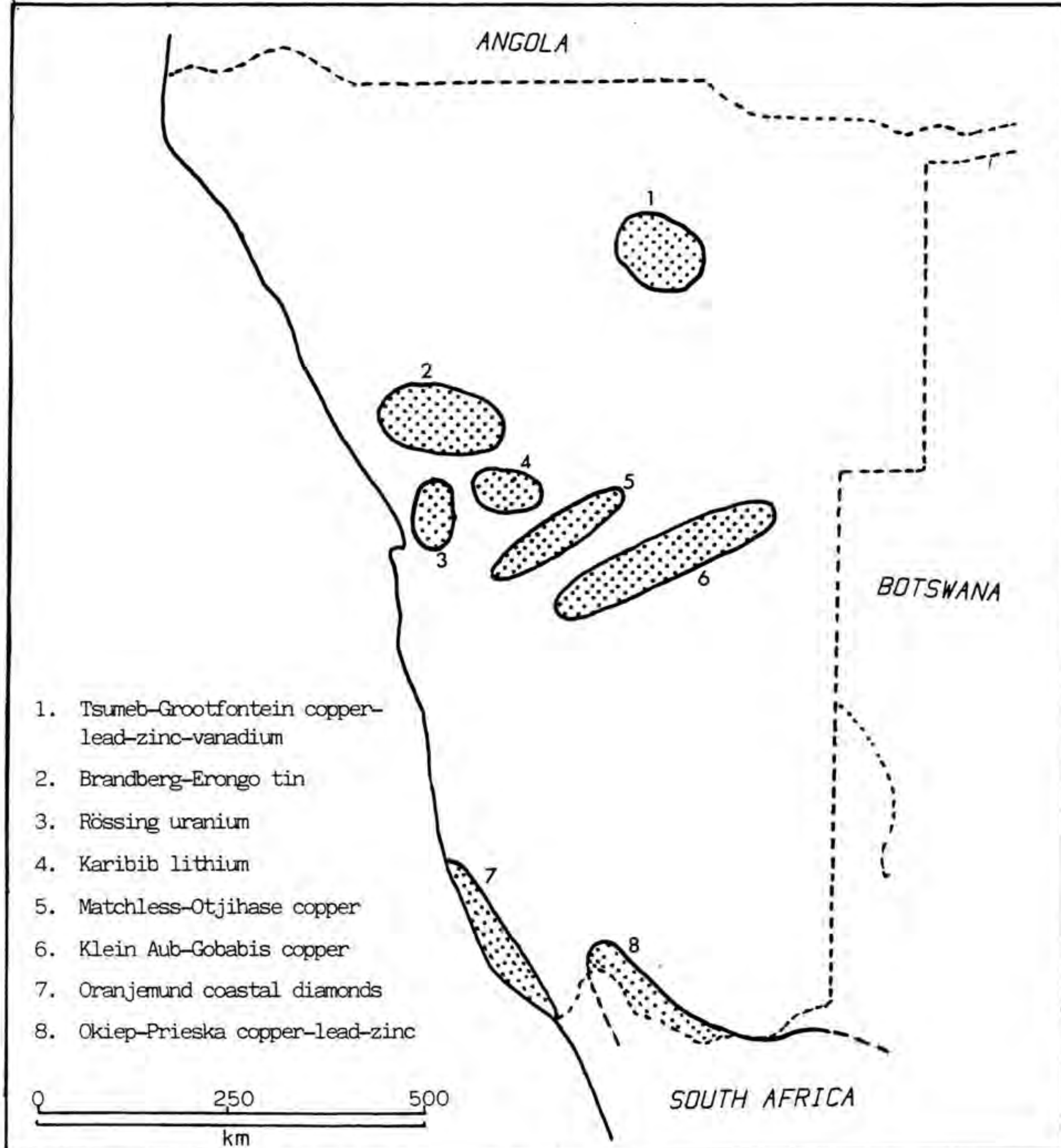
The major mines operating in SWA/Namibia can be grouped into eight mining districts as indicated on map 1, viz. Tsumeb - Grootfontein, Brandberg - Erongo, Rössing, Karibib, Matchless - Otjihase, Klein Aub - Gobabis, Oranjemund and finally Okiep - Prieska, which forms part of a larger district stretching into South Africa. The principal minerals exploited in these districts are non-ferrous base metals, uranium, diamonds and pegmatite minerals. These districts may be seen as mining areas which hold immediate economic potential, because the necessary infrastructural facilities are already available in these regions.

There is, however, considerable mineral potential in regions other than those mentioned above. Exploration in some of these regions has been fairly intensive and several good mineral deposits have been identified. Development of these deposits is held back, however, by lack of interest by private mining concerns and by a lack of infrastructure in some remote areas.

To illustrate the diversity of mineral occurrences and their geographical distribution, four additional maps are presented here. Maps 2 to 5 give more detailed information of the mineral occurrences of non-ferrous base metals, non-metallics and other minerals in SWA/Namibia [**NOTE 1**]. With the exception of marble and aragonite, the sources of rock and sand suitable for building purposes are not indicated on the maps. Schall and Van Solms (1984: 11-16), however, give a good account of these occurrences.

It is said that the possibility of finding large additional exploitable deposits through superficial prospecting methods seems remote. However, with sophisticated and expensive exploration programmes there is a fairly good possibility for finding further large exploitable deposits. The fact that tentative indications of a large number of mineral occurrences in the country have already been made, should assist these exploration programmes. Mineral occurrences which justify further exploration are inter alia diamonds in the sea

MAP 1 - THE MINING DISTRICTS OF SWA/NAMIBIA

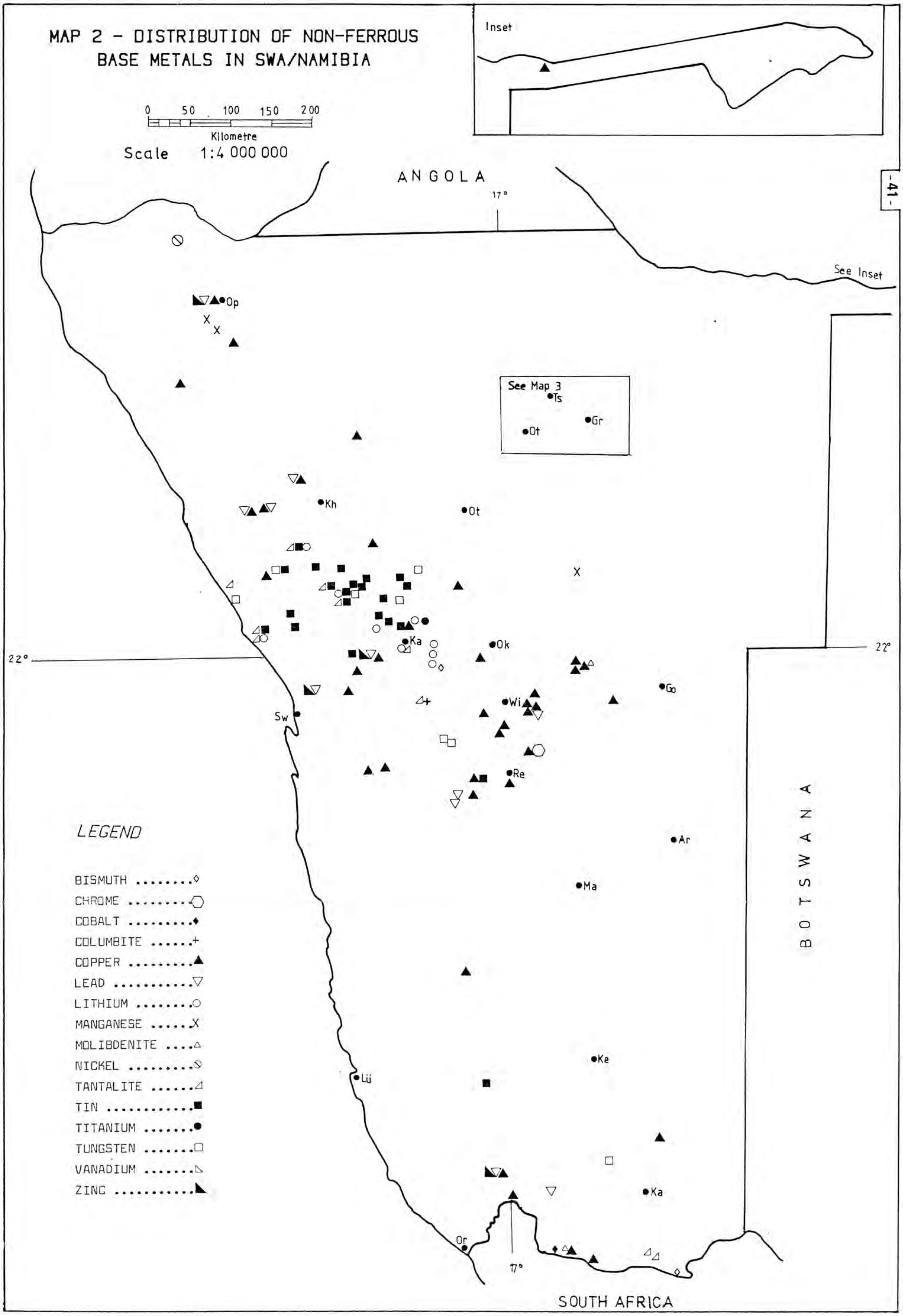


Source: Van Rensburg & Pretorius, 1977, pp. 42-43

areas along the coast, natural gas north of Oranjemund and various uranium occurrences on land (Directorate of Development Co-ordination, 1985b: 2). The numerous inactive mines in the country should also be investigated to determine whether the remaining reserves (if any) are suited for redevelopment on a small or on a consolidated scale. The exploitation of existing coal deposits (in the Aranos and Etosha areas) and limestone deposits (in the Karibib area) should also be considered (FNDC, 1984: 71-72).

Judging from the distribution of mineral occurrences denoted on maps 2 to 5, it is clear that the distribution is of such a nature that it

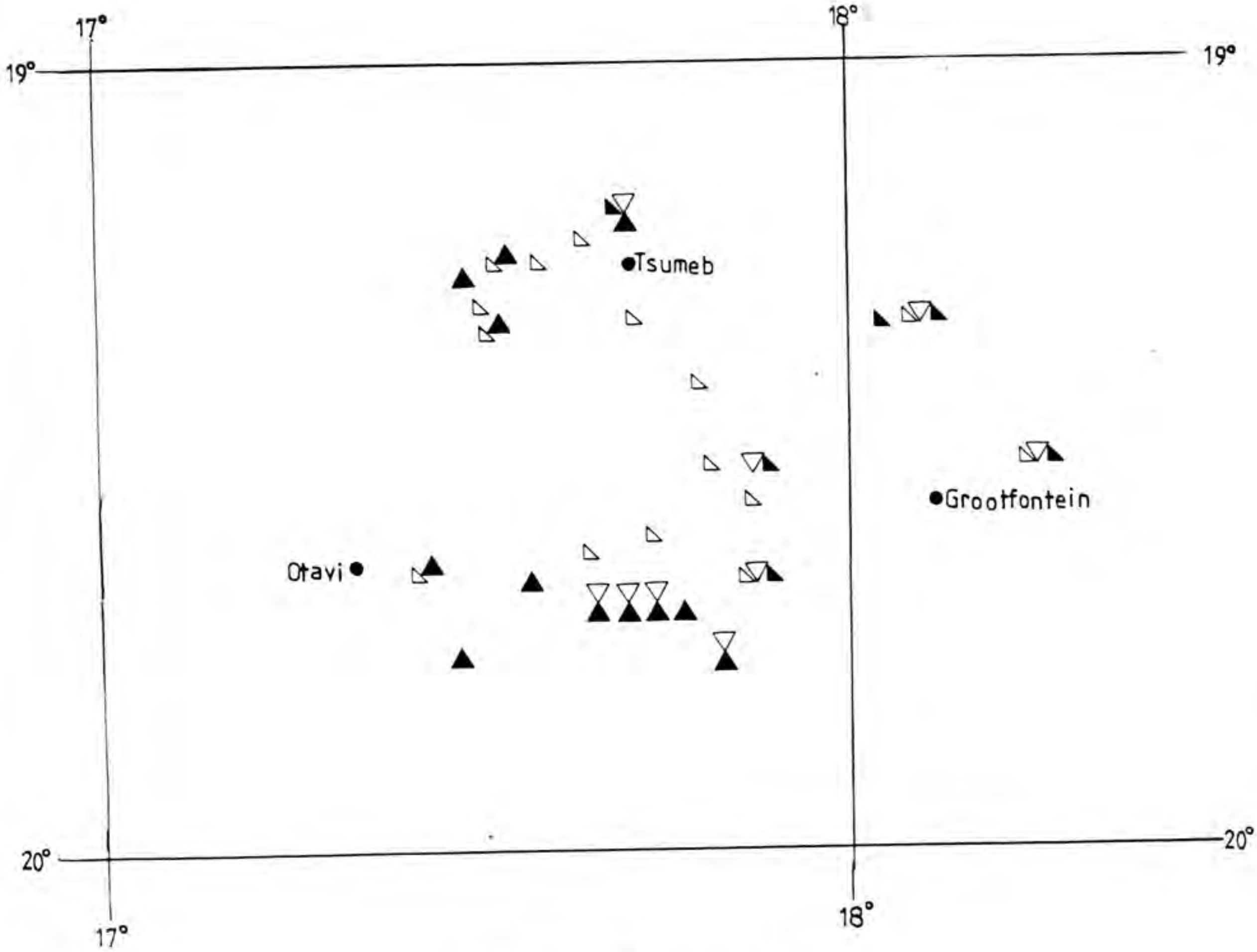
MAP 2 - DISTRIBUTION OF NON-FERROUS BASE METALS IN SWA/NAMIBIA



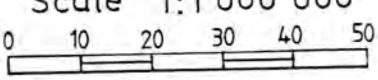
MAP 3 - DISTRIBUTION OF NON-FERROUS BASE METALS IN TSUMEB-GROOTFONTEIN AREA

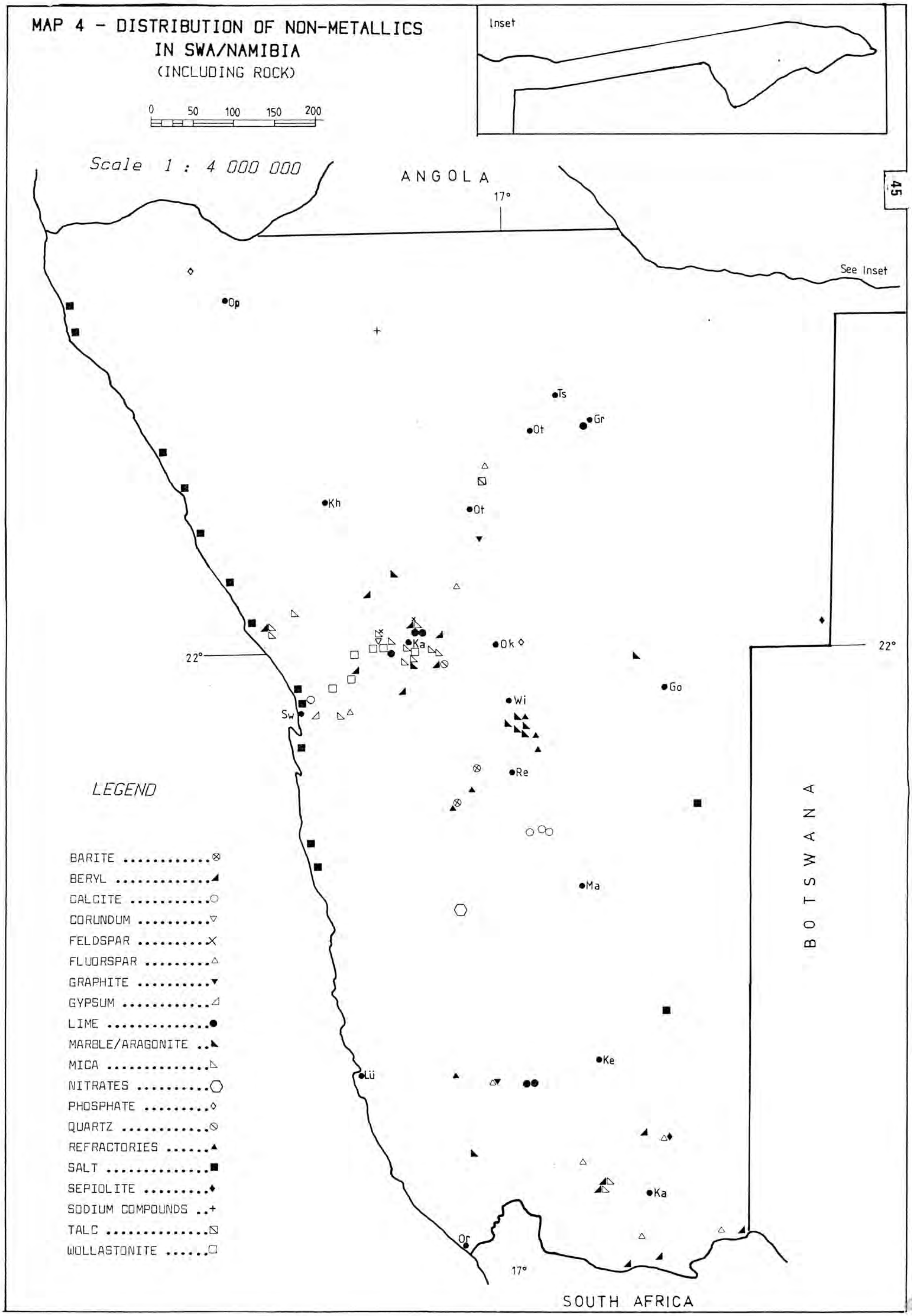
LEGEND

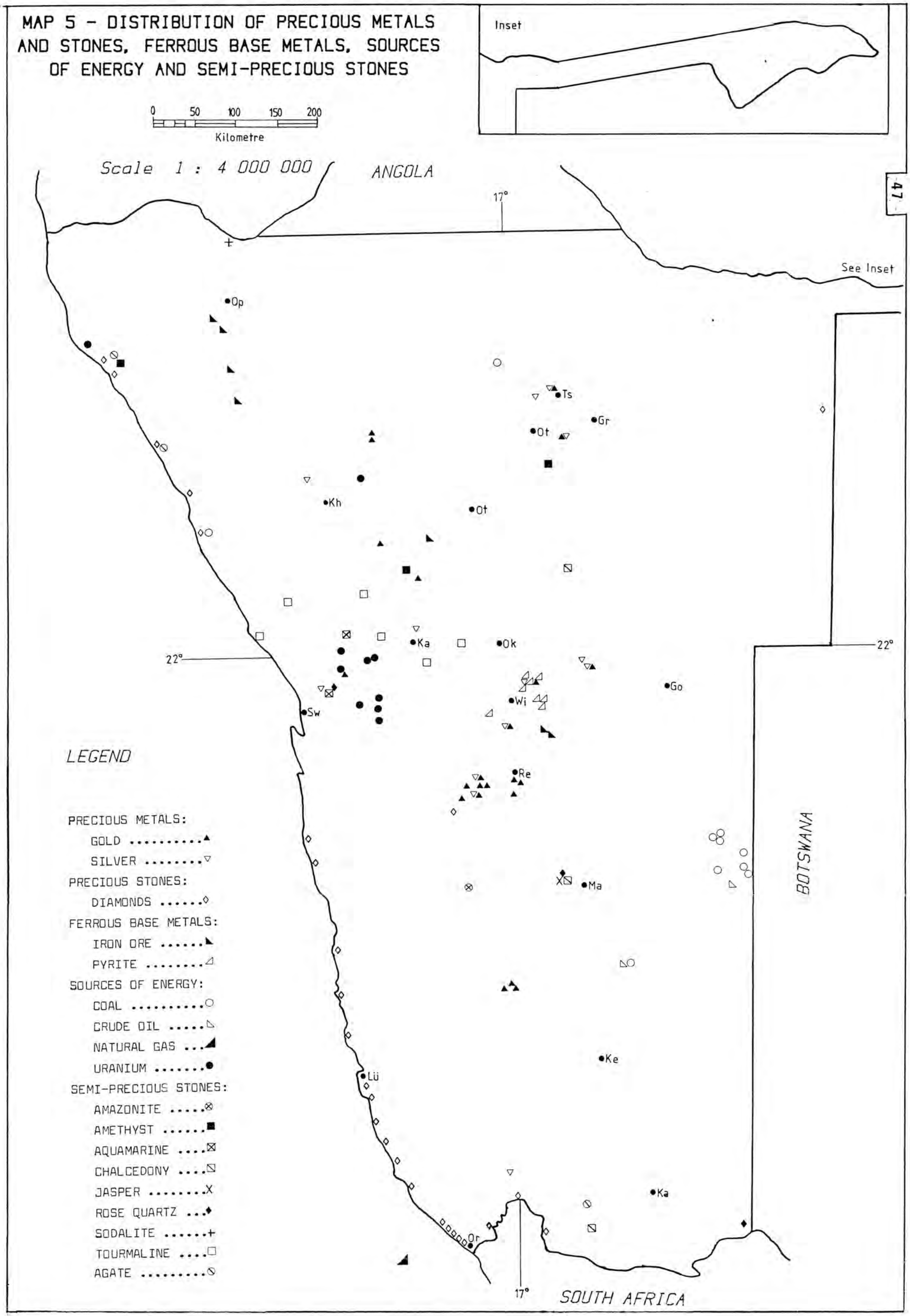
COPPER ......▲
LEAD ....▽
VANADIUM ....◺
ZINC ....◣



Scale 1:1 000 000




MAP 4 - DISTRIBUTION OF NON-METALLICS IN SWA/NAMIBIA
(INCLUDING ROCK)
0 50 100 150 200
Scale 1 : 4 000 000
Inset
ANGOLA
17°
See Inset
22°
BOTSWANA
SOUTH AFRICA
Op
Ts
Gr
Ot
Kh
Ok
Ka
Go
Wi
Sw
Re
Ma
Ke
Lü
Or
LEGEND
BARITE
BERYL
CALCITE
CORUNDUM
FELDSPAR
FLUORSPAR
GRAPHITE
GYPSUM
LIME
MARBLE/ARAGONITE
MICA
NITRATES
PHOSPHATE
QUARTZ
REFRACTORIES
SALT
SEPIOLITE
SODIUM COMPOUNDS
TALC
WOLLASTONITE



MAP 5 - DISTRIBUTION OF PRECIOUS METALS AND STONES, FERROUS BASE METALS, SOURCES OF ENERGY AND SEMI-PRECIOUS STONES ture was available; in many cases the infrastructure was created after or while the mine was being developed. As will be seen later in chapter eleven, there is very little correlation between the expenditure incurred by the government in providing the necessary infrastructure and the tax paying ability or the economic future of a mine.

Maps 6 to 9 depict the values of mineral production at constant 1975 prices during 1950, 1960, 1970 and 1983. The basic data presented in tables A.7 and A.11 served as basis for the compilation of these maps. The major mineral industries indicated on these maps will be discussed in the next section.

2.4 THE MAJOR MINERALS AND MINERAL INDUSTRIES OF SWA/NAMIBIA

2.4.1 DIAMONDS

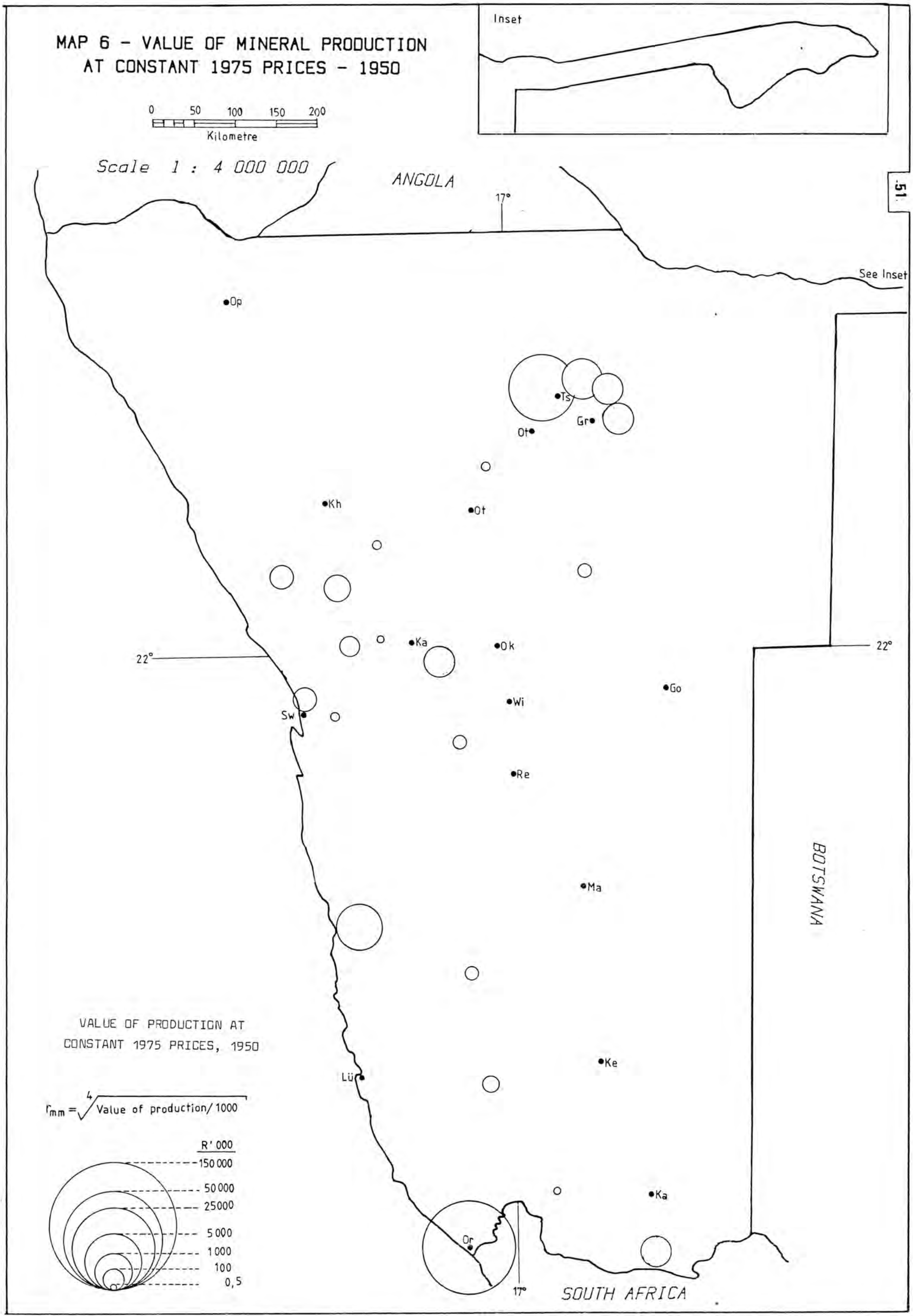
Diamond mining is one of the oldest industries in SWA/Namibia. Its history, beginning with the discovery of the first diamond deposit in 1908, is very intriguing, prompting many authors over the years to report on the tragedies, the romance and the wealth of diamond mining.

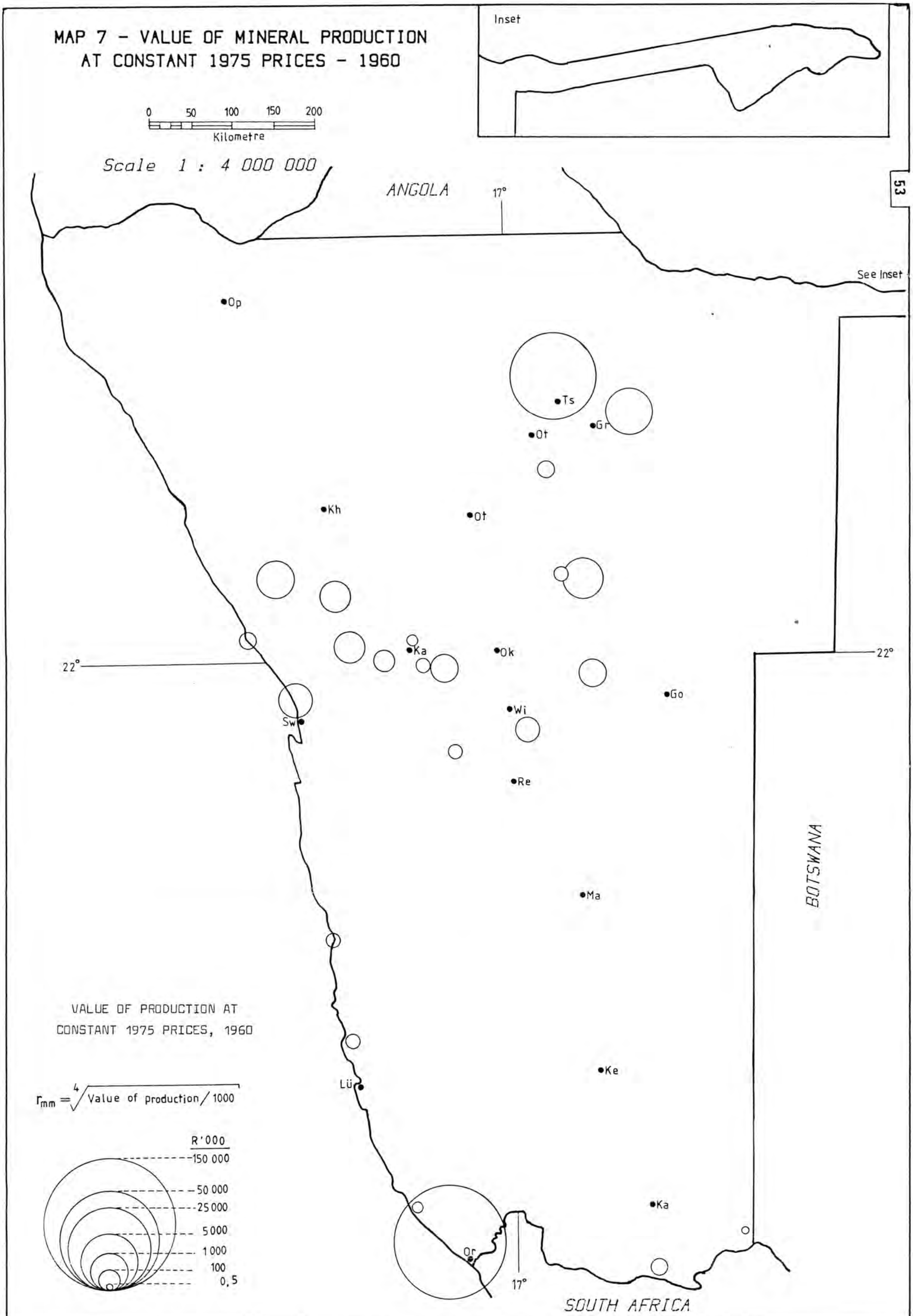
Not many diamond deposits were discovered in SWA/Namibia, but those that were found were major discoveries. Diamonds were first mined at and to the South of Lüderitz under German rule. After World War II and the South African take over of the territory, attention was shifted further South from the old German diggings. During 1928 diamond-rich gravels were struck in marine terraces at the Orange River mouth and these deposits were later traced 100 km further north from the Orange River.

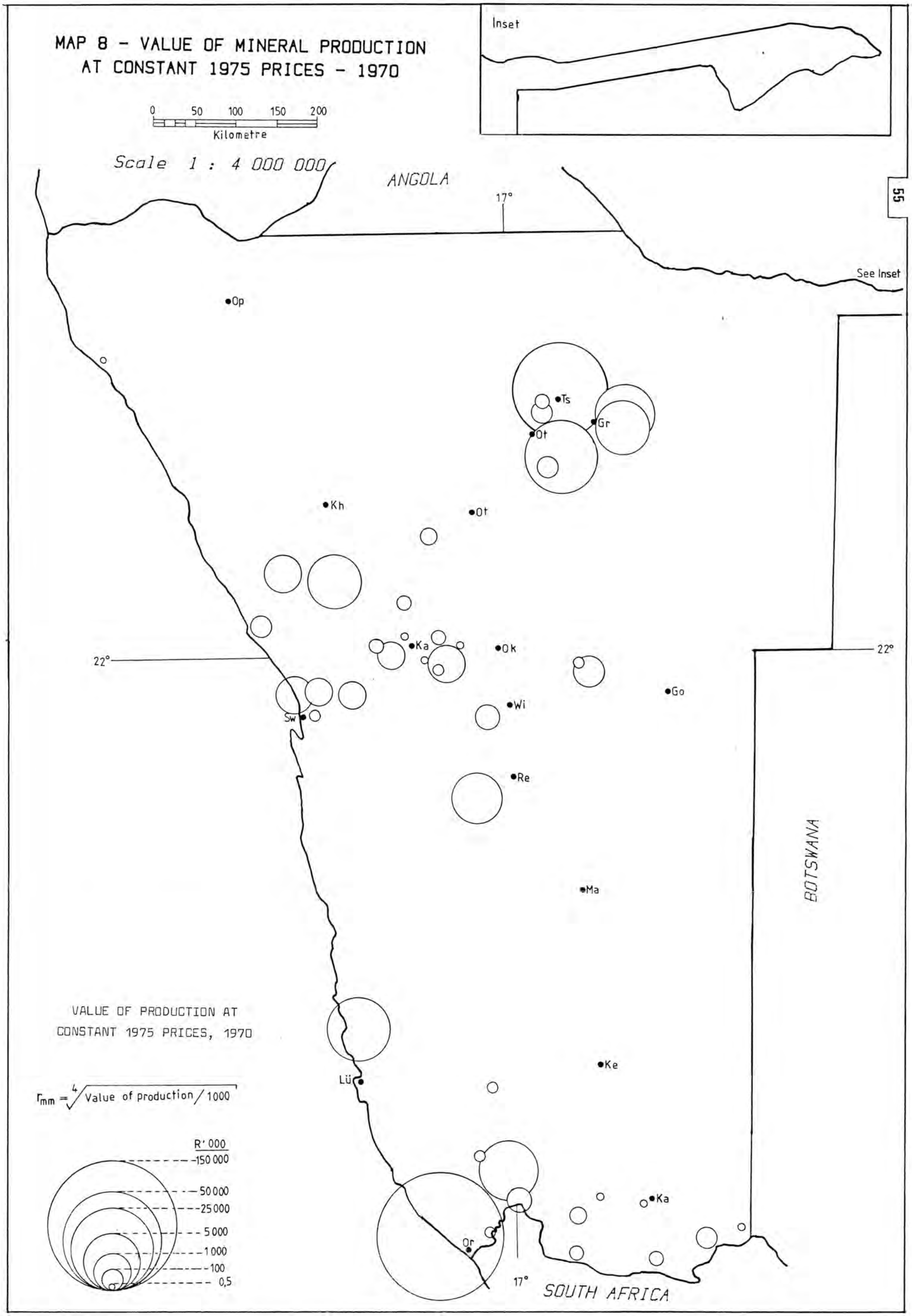
No diamond deposits of the magnitude of the one at Lüderitz and Oranjemund were discovered elsewhere in the country, although some diamonds were also mined at the coast north of Lüderitz, on the northern part of the coast - north of the Ugab River mouth and to the interior on the banks of the Orange River. Very few discoveries of diamonds from kimberlite pipes were made, although kimberlites occur widely in certain areas. For this reason all diamonds mined economically are from marine deposits. About the origin of these deposits, there is no consensus among geologists. A certain school claims that over the ages all diamonds along the shore of SWA/Namibia were brought to the ocean by the Orange River from the high interior, hundreds of kilometres away, behind the great escarpment, of what is today South Africa, Botswana and Lesotho (Williams, 1978: 86). Others hold the theory that the diamonds found on the northern side of the Orange River mouth may well have originated from the Kimberley area or alternatively from the interior of SWA/Namibia where kimberlitic formations occur, like the Berseba area or the Huns mountains. Diamonds from the latter locations are said to have been washed to can form a good basis for regional development in the country. Most regional development studies done in SWA/Namibia until now where mainly aimed at identifying the general development potential in small, demarcated ethnic areas. Regional development studies should go further than this by identifying the development potential in larger areas and then working towards certain specific projects. In this regard the country could be divided into rough mining potential regions: the South-Eastern part, which includes the pegmatite areas in the South and the coal deposits in the East; the South-Western parts, which embraces the diamond fields on the coast, at sea and along the Orange River, and the base metal occurrences in the Rosh Pinah area as well as natural gas occurrences at sea. The Western parts could include mainly the uranium, marine salt and pegmatite areas, the Central and the North-Western parts could concentrate mainly on base metals, while possible crude oil occurrences in the Northern parts and possible diamond occurrences in the North-Eastern parts could be investigated further. Studies of this kind should not only look at mining and exploration in isolation, but should also identify mining's forward and backward linkage with other industries or potential industries in an attempt to diversify the economy. Ample provision for small-scale mining should be made, since many mineral occurrences identified on the maps are suitable to be exploited only by small-scale mining methods. It is not possible, however, to go into any detail on the issue of regional development, but detailed and co-ordinated studies on mineral potential and its role in industrial and regional development will become imperative for sustained economic progress in the country. Aspects like the diversification of the mining industry and small-scale mining on the other hand will be discussed in more detail in the next chapter.

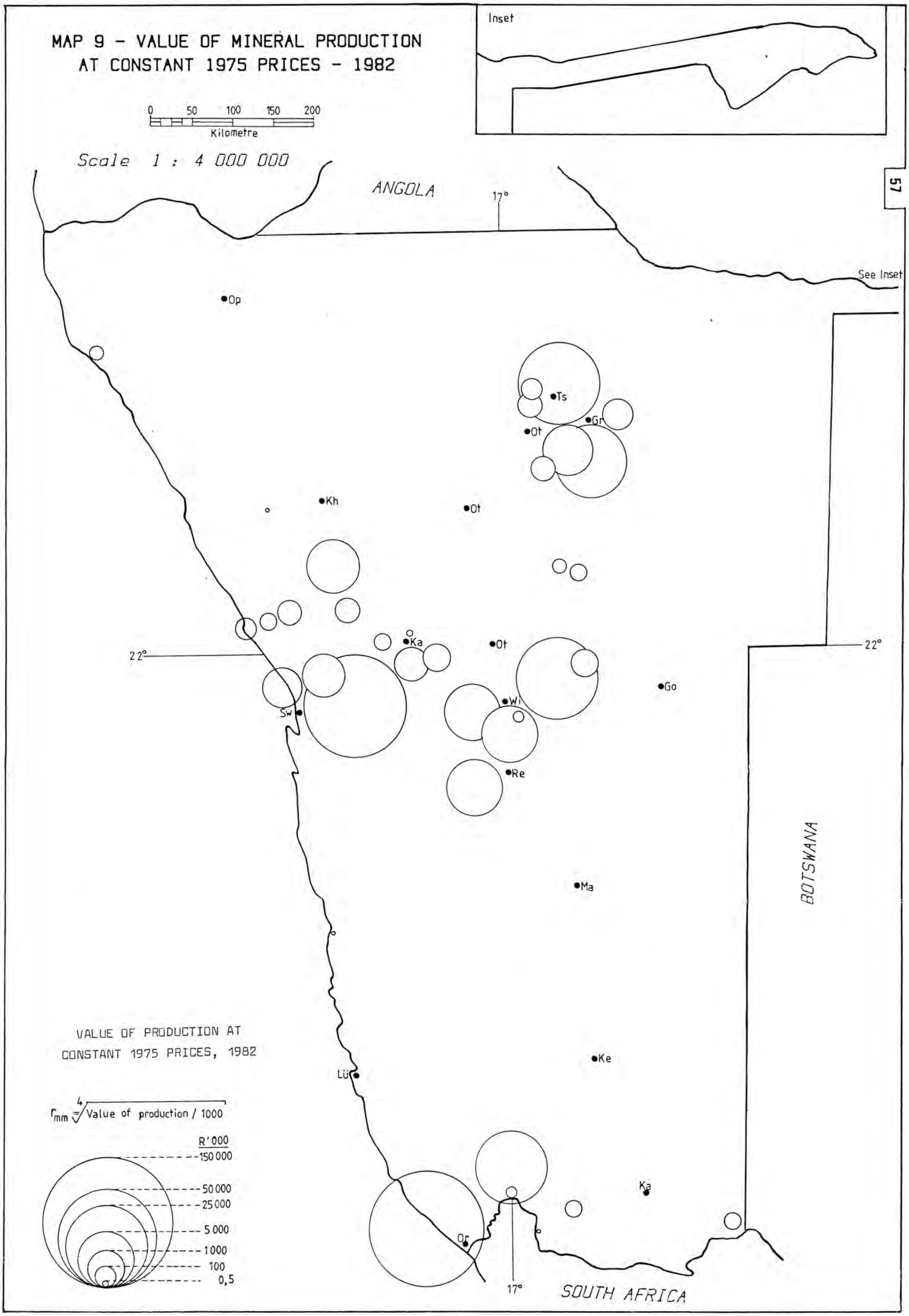
2.3 THE GEOGRAPHICAL ORIGIN OF MINERAL PRODUCTION

In this section the physical volume production is illustrated by means of maps. When these maps are compared with those in the previous section of mineral occurrences, one striking feature is how few mines are actively engaged in production in relation to the vast occurrence of minerals in the country. Even over a period of more than three decades very little has changed in this trend. A second characteristic is that the bulk of mineral production is concentrated at three big mines, viz the Oranjemund mine (diamonds), the Tsumeb mine (copper, lead, zinc, silver, arsenic, cadmium, etc.) and finally, the Rössing mine (uranium), which started production in the mid 'seventies. Apart from these large mines, there are a few medium sized mines and numerous smaller mines which are scattered all over the country. Finally, as is to be expected, most of these mines are located where the necessary infrastructure in the form of electricity and water supply, road and rail links and telecommunication is available. However, not all the mines have developed where the infrastruc-


MAP 6 - VALUE OF MINERAL PRODUCTION
AT CONSTANT 1975 PRICES - 1950
0 50 100 150 200
Kilometre
Scale 1 : 4 000 000
Inset
ANGOLA
17°
See Inset
Op
Ts
Gr
Ot
Kh
Ot
Ka
Ok
22°
Go
Sw
Wi
Re
BOTSWANA
Ma
VALUE OF PRODUCTION AT
CONSTANT 1975 PRICES, 1950
Lü
Ke
$r_{mm} = \sqrt[4]{\text{Value of production}/1000}$
R' 000
150 000
50 000
25 000
5 000
1 000
100
0,5
Ka
Or
17°
SOUTH AFRICA


MAP 7 - VALUE OF MINERAL PRODUCTION
AT CONSTANT 1975 PRICES - 1960
0 50 100 150 200
Kilometre
Scale 1 : 4 000 000
Inset
ANGOLA
17°
See Inset
Op
Ts
Gr
Ot
Kh
Ot
Ka
Ok
22°
22°
Sw
Go
Wi
Re
BOTSWANA
Ma
VALUE OF PRODUCTION AT
CONSTANT 1975 PRICES, 1960
Ke
Lü
$r_{mm} = \sqrt[4]{\text{Value of production} / 1000}$
R'000
150 000
50 000
25 000
5 000
1 000
100
0,5
Ka
Or
17°
SOUTH AFRICA


MAP 8 – VALUE OF MINERAL PRODUCTION
AT CONSTANT 1975 PRICES – 1970
0 50 100 150 200
Kilometre
Scale 1 : 4 000 000
Inset
ANGOLA
17°
See Inset
Op
Ts
Gr
Ot
Kh
Ot
Ka
Ok
22°
22°
Go
Sw
Wi
Re
BOTSWANA
Ma
VALUE OF PRODUCTION AT
CONSTANT 1975 PRICES, 1970
Ke
Lü
$r_{mm} = \sqrt[4]{\text{Value of production}/1000}$
R' 000
150 000
50 000
25 000
5 000
1 000
100
0,5
Ka
Or
17°
SOUTH AFRICA


MAP 9 - VALUE OF MINERAL PRODUCTION
AT CONSTANT 1975 PRICES - 1982
0 50 100 150 200
Kilometre
Scale 1 : 4 000 000
Inset
ANGOLA
17°
See Inset
Op
Ts
Gr
Ot
Kh
Ot
Ka
Ot
22°
22°
Go
Sw
Wi
Re
BOTSWANA
Ma
VALUE OF PRODUCTION AT
CONSTANT 1975 PRICES, 1982
Ke
Lü
$r_{mm} = \sqrt[4]{\text{Value of production / 1000}}$
R'000
150 000
50 000
25 000
5 000
1 000
100
0,5
Ka
Or
17°
SOUTH AFRICA

their present location by the local Fish River. According to certain geologists, the diamonds found at and to the south of the Lüderitz area originate from the Klinghardt mountains, where kimberlitic formations occur. This school of thought also claims that diamonds occurring on the northern part of the coast also originate from kimberlitic sources from still unknown sources in the interior of the country (Söhnge, 1984: 5).

The diamond mining industry in SWA/Namibia has always been concentrated among a very few companies. In the early days of German rule hundreds of private producers were engaged in diamond mining, but after the industry had established itself and the feverish diamond rush had subsided, the interests were concentrated among a few large concerns. The industry at that stage may well be described as oligopolistic. After the South African take-over of German South West Africa, most of these interests were acquired by the Anglo American Corporation of South Africa Limited and amalgamated into The Consolidated Diamond Mines (CDM). In 1931 De Beers Consolidated Mines Limited acquired Anglo American's interest in CDM and became a wholly owned subsidiary of De Beers in 1975. Under the Halbscheid Agreement CDM acquired the sole right to mine and prospect in the "Sperrgebiet" (prohibited area), an area stretching from the Orange River mouth northwards to about 70 km south of Walvis Bay and to a line roughly 100 km from the sea parallel to the coast (Cowley, 1983: 69). This area is about 54 200 square km in extent, which is about 6,6 per cent of the total area of SWA/Namibia. The industry in the CDM era may rightly be described as monopolistic. Apart from CDM, many other diamond mining companies are still in existence (about 20 such companies are registered at the Registrar of Companies in Windhoek), but their production is intermittent and amounts to less than one per cent of the total diamond production in the country.

CDM's mining process entails the stripping of up to 40 million cubic metres overburden per annum along the coast, which is 25 metres deep in places. This exposes the diamondiferous conglomerate. CDM is also engaged in the recovery of diamonds from the foreshore. This operation requires the pushing-back of the surf for about 100 metres, holding it at bay by a wall of sand and removing the overburden. The diamond-bearing material is in fact recovered from below sea level. The gravel and conglomerate is then treated through crushing, screening, milling and heavy-media separation, during which most of the waste is removed. Finally, a sophisticated X-ray process, followed by hand sorting, separates the diamonds from the concentrate (Cowley, 1983: 72). In addition, marine mining for diamonds is also conducted successfully at intermittent intervals. Here the diamond-bearing gravel, shell and sand are dredged from the sea-bed by means of air or water jet lifts from a boat especially constructed for this purpose.

According to data contained in table A.10 and unpublished data from the Department of Finance, the production of diamonds from 1909 until 1985 has a total mass of just less than 12 metric tonnes, and the value of total sales during the same period amounted to R5 402 million at current prices and to R23 192 million at 1985 prices.

The future of diamond mining in SWA/Namibia depends on the exploration and prospecting done by private and government institutions. At present very little is known to and done by the Government to determine the exact reserves of diamonds in the country and particularly in the CDM mining areas. This has led to many heated debates by concerned citizens and to the appointment of a Commission of Enquiry into these and other aspects relating to the mining and pricing of minerals in the country. The findings and recommendations of the Commission are still studied by the government and will hopefully lead to a more pragmatic minerals policy so that the future of the diamond mining industry can be determined, stabilised and possibly extended.

With the future of the Oranjemund mining area in the balance, exploration and prospecting should be devoted to new areas, e.g. along the banks and former banks of the Orange River and at sea. New kimberlites could be discovered in areas like Bushmanland (in the north-eastern part of SWA/Namibia), where prospecting by private companies has been going on for some time, but very little is made known about the potential of that area (Directorate of Development Co-ordination, 1984: 77).

2.4.2 URANIUM

Although radioactive materials were found in the Rössing area as early as 1910, it was not until 1966 when active prospecting was done to determine the extent and content of uranium in that area. It was later established that the uranium deposit, occurring in pegmatitic granite in the form of uraninite and beta-uranophane, near Rössing was large, but of a low grade and could only be mined on a large scale (RUL, 1985: 8). After many years of prospecting a syndicate was formed which later negotiated with interested concerns who further investigated the deposit. Initially many companies declined the option to mine the deposit, but during 1970 the company Rössing Uranium Limited was formed with the original syndicate, the Rio Tinto Zinc Corporation, the Industrial Development Corporation of South Africa (IDC), the General Mining and Finance Corporation and a French consortium as shareholders (Fischer, 1979: 149).

In June 1976 the first uranium oxide (U_3O_8) was produced from the initial pilot plant work and, after some major modifications in the processing of the mineral, the company started its commercial operations during 1978. From 1976 to 1985 about 37 800 metric tonnes of uranium oxide with a value of about R2,7 billion have been produced. The annual production of uranium-oxide of around 4 500 tonnes is sufficient to supply 25 power stations the size of Koeberg (i.e. 25 times 1840 Mw); this is equivalent to the amount of power consumed by 10 cities the size of London (Grosser-Hofer, 1982: 52). In 1981, uranium mining has overtaken diamond mining as the largest single contributor to the GDP and as the largest single earner of foreign exchange.

Many more uranium deposits were discovered in subsequent years, most of them around the Rössing deposit. Major surficial deposits as indicated on map 3, are inter alia at Langer Heinrich, Trekkopje, Tubas and Aussinanis (Hambleton-Jones & Simonsen, 1985: 7). The uranium deposit in Kaokoland near Cape Fria is also said to hold economic potential (van der Merwe, 1983: 61).

The prospects for establishing new uranium mines in SWA/Namibia, depend largely on the world uranium market, which at present is a buyer's market owing to the international over-production of the metal. On the other hand another important consideration is the possibility of economies of scale in producing uranium locally. It is said that if future uranium mines could be established in the vicinity of the Rössing mine the existing plant could be used. The distances between the future mines and the plant will play a crucial role in this regard. In addition the fact that uranium is produced locally as a main and not as a by-product, compared with South Africa, for example, where its uranium is the by-product of gold production, will also prove to be a severe setback. A third important factor is the unit price of uranium which is fixed by standing, long-term contracts. The current spot price, however, is much lower and is at present a more likely indicator of the true market value of uranium. The unit price of uranium will thus be the decisive factor in the decision to establish new uranium mines in the country. Finally, international competition from countries in which uranium occurs at a much higher grade than that in SWA/Namibia will also be an important consideration in future prospects. On the whole, the prospects for establishing new uranium mines do not seem good.

2.4.3 THE TSUMEB MINERALISATION AND SMELTER

Copper is the mineral occurring most commonly in SWA/Namibia; more than 50 copper occurrences are depicted on maps 2 and 3. However, only about ten of these are being mined at present. The most notable copper deposit is at the Tsumeb mine which, together with other important minerals such as lead, zinc, silver, arsenic and cadmium, is one of the world's most versatile deposits as far as the number of different minerals is concerned.

The history and mineralisation of Tsumeb is also the theme of many books being written locally and overseas. In 1851 the first European reported on the occurrence of copper in the Otavi mountain land, and the first professional report on the magnificence of the Tsumeb mineralisation was made by Mathew Rogers for the South West Africa Company (SWACO) of London during 1893. In 1900 the Otavi Minen- und Eisenbahn-Gesellschaft (OMEG, German-British) acquired the mineral rights for the Tsumeb area from SWACO and by 1906 a narrow-gauge railway line built by OMEG from Swakopmund to Tsumeb, was opened. Initially the ore was exported to Europe with no beneficiation other than by hand-sorting, but a mechanical concentrating plant was set up in 1908 to improve ore separation. After varied technical problems had been overcome, the plant, including a smelter (commissioned in 1907), operated at a slight profit by 1909. As a result of the First World War, the Tsumeb mine was closed in 1915 when the German garrison surrendered to the South African forces, but was subsequently reopened in 1921 (Söhnge, 1967: 44).

Owing to the Second World War the Tsumeb mine was closed again in 1940. After submitting a successful tender offer, a grouping of several American, British and South African companies purchased the mineral rights and physical assets (including farms) from the South African Custodian of Enemy Property, and formed Tsumeb Corporation Limited (TCL) as the successor to OMEG.

The newly-constructed Tsumeb mill commenced producing concentrates in 1948 following the dewatering of the mine. The construction of the copper-lead smelting complex at Tsumeb also began in 1960 and led to the production of the first metal during 1963 (Söhnge, 1976: 66 & 73).

The Tsumeb smelter today treats all the copper and lead produced in the country and in addition handles custom smelting for some overseas clients. The integrated smelter is equipped to recover silver, arsenic and cadmium as by-products and is said to be one of the major polymetallic base metal operations in the world. Since the commissioning of the smelter in the early 'sixties, 853 kiloton of blister (electrolytic) copper and 1 129 kiloton of refined lead were produced.

Numerous other deposits were discovered and worked intermittently by the former OMEG and now by TCL. Many of the deposits around Tsumeb, Otavi and Grootfontein indicated on maps 2 to 5 were in fact discovered during the German era under the auspices of OMEG and SWACO. Of the mines still in operation today are the Kombat and the Asis Ost mines, which began production during 1908 and 1911, respectively.

2.4.4 OTHER MINERALISATIONS

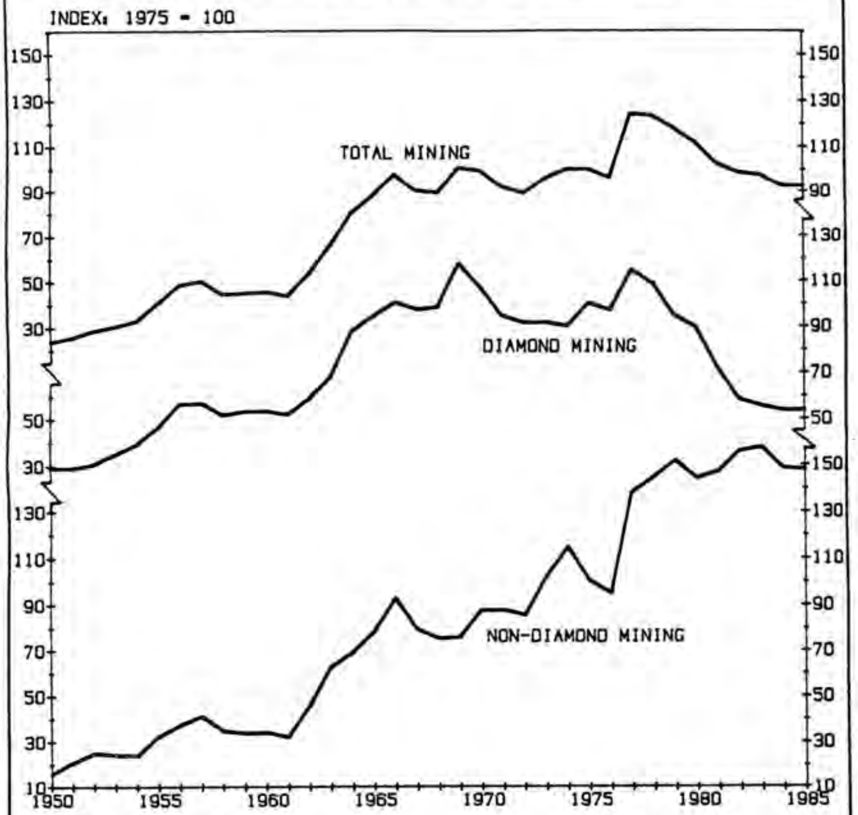
During the German era trading companies carried out a great deal of prospecting but, with the exception of copper and diamonds, the results were disappointing. Still, as early as 1915 a large number of deposits had been found - gold, tin, lead, sulphur, iron, wolfram and marble - but the lodes proved too irregular and unreliable for mining. (Terry, 1978: 38). However, some of the more payable deposits are still being worked today.

On maps 2 to 5 numerous other mineral deposits are indicated apart from the three described above. Among the more important mineralisations are the pegmatite intrusions in the Karibib-Damaraland area, the marine salt pans, the copper deposits in the Windhoek-Witvlei-Rehoboth triangle and the base metal deposits in the Rosh Pinah area. The data, which forms the basis for maps 6 to 9, the sources of which were mentioned in section 2.3, indicate that during 1982 the value of mineral production of the 20 odd mines operating in these four areas amounted to R96 million, which represents 13 per cent of the total mineral production, or 77 per cent if the three major mines i.e. Tsumeb, Rössing and Oranjemund are excluded. It is also important to note that the value of minerals mined in the four identified areas has increased considerably over the years; this indicates that the trend in the mining of minerals in SWA/Namibia is towards large to medium-sized mines, rather than to small mines. The value of mineral production from these areas as percentage of total mineral production increased from 2 per cent in 1960, to 8 per cent in 1970 and to 13 per cent during 1982. Again excluding the three largest mines, the share of production in total production decreased from 40 per cent in 1960 to 28 per cent in 1970 and again increased to 77 per cent in 1982.

2.5 THE PHYSICAL VOLUME OF MINERAL PRODUCTION

In order to give an indication of the physical volume of total mineral production, a method should be used here which combines the production of all the different minerals into one indicator. This is done by using the weighted volume index of Laspeyres where the weights are taken as the unit prices in the base year (po). The weighted index would then be $Q_L(t) = (\Sigma q_t p_o / \Sigma q_o p_o) \times 100$. According to this index, which is depicted in figure 2.1, the physical volume of total mineral production has increased more than five-fold since 1950. It appears also that the largest long-term growth occurred during the 'sixties after which, particularly during the early 'seventies, it showed a decline until the late 'seventies when a steep rise took place which lead to the peak in mineral production during 1978. After that a sharp decline in mineral production began, bringing it down to the levels which prevailed during the early 'seventies.

FIGURE 2.1 - PHYSICAL VOLUME OF MINERAL PRODUCTION

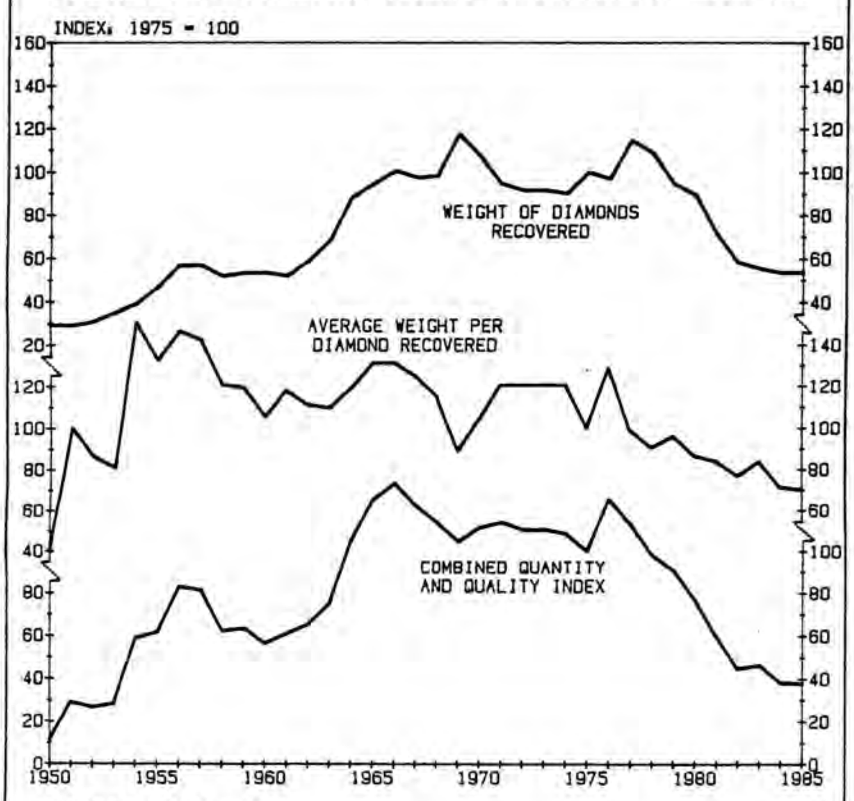


SOURCE: Table A.12.

With diamond mining accounting for about two-thirds of the movement of the combined index, the trend in total physical production was very much dictated by changes in diamond production and in a way depressed the performance of non-diamond mining in the combined index. The choice of 1975 as base year was rather unfortunate, since commercial production of uranium had not yet started during that year. This means that uranium mining which later overtook diamond mining in value, only has a very small weight in the base year, implying that subsequent increases in uranium mining are reflected only to a small extent in the index value. If, for example, 1980 had been chosen as base year (as was done with all official indices and national accounts data recently), diamond mining would have accounted for only 51,6 per cent of the movement of the combined index, whereas the weight for uranium would have increased from 1,1 per cent in 1975 to 30,5 per cent in 1980. The changed weights of each mining industry in the combined index are determined by changes in both the volume of output and the unit price in any particular base year chosen. The change in the base year could thus result in some changes in the trend of physical production, and hence, in the real value added as well. However, to retain data comparability, the 1975 base year will still be used for purposes of volume and price analyses.

It is necessary to present another qualification to the above diamond mining component of the index. Only quantity as measured by the total annual weight of diamonds recovered is represented in the annual index. The quality of diamonds on the other hand may be roughly indicated by the average weight per diamond recovered. It is generally accepted that the larger the diamond, the higher the quality and hence the higher the price. These ratios may then be expressed in index form and may also be combined with the quantity index to get an indication of both quantity and quality. These three indices are depicted in figure 2.2 below, from which it appears that during 1969 the highest quantity of diamonds was produced, and on average the largest diamonds were recovered as early as 1954, after which a gradual decline in the quality was experienced. The combined quantity and quality index thus gives a good indication of the real trend in diamond mining. The production index calculated in this way reveals that a sharp increase in production was experienced from 1950 until the mid-'sixties, after which it remained more or less at that level until 1976. Since 1976, however, a gradual decline in the combined index has been recorded, resulting from the deterioration of both the quality and the quantity of diamonds recovered, which might suggest that the main source of diamonds at Oranjemund is in a process of being depleted.

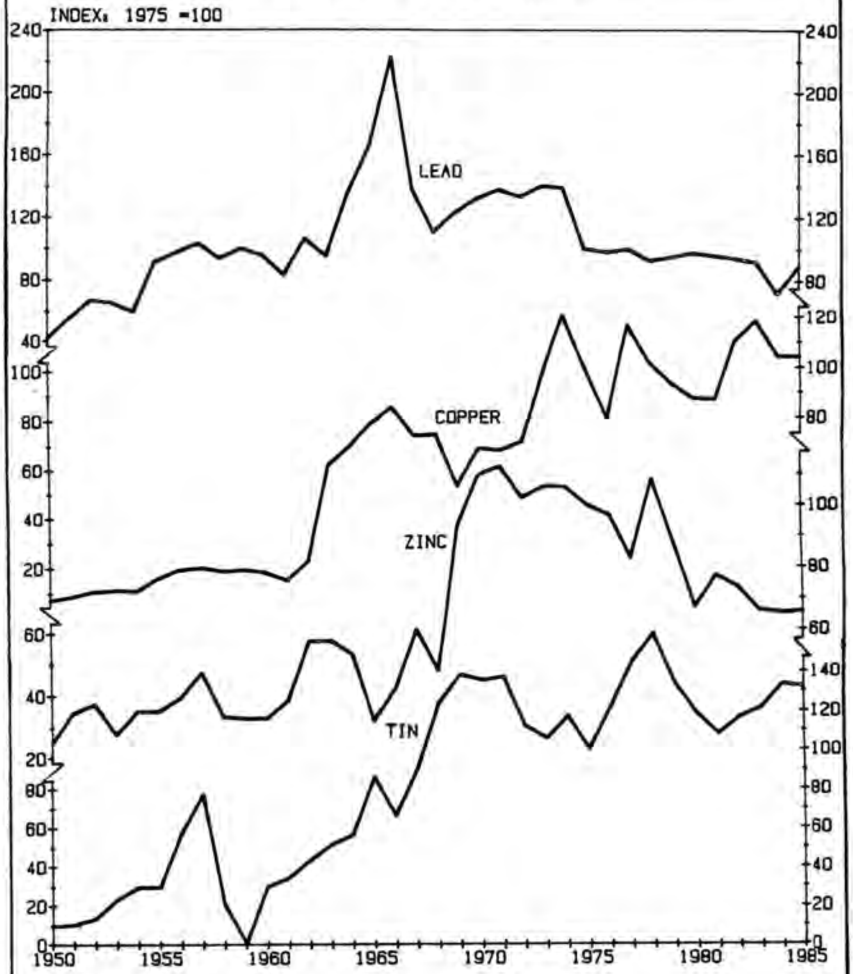
FIGURE 2.2 - PHYSICAL VOLUME OF DIAMOND PRODUCTION



SOURCE: TABLE A. 13.

The performance of non-diamond mining is recorded in figure 2.3. The four minerals identified, viz., copper, lead, zinc and tin account for about 85 per cent of the movement of the non-diamond mining index. It appears that the production of these important base metals shows large fluctuations over the entire period. The longest period of consistent growth in the production of copper occurred during the 'fifties and

FIGURE 2.3 - PHYSICAL VOLUME OF PRODUCTION OF SELECTED BASE METALS



SOURCE: TABLE A.14.

the production of lead and tin showed sharp increases during the 'sixties. The peak of production of copper was recorded in 1974 and again later during 1983, and that of lead occurred during 1966. The production of zinc reached the maximum levels during the early 'seventies after which a gradual decline in production set in, mainly owing to the closure of the Berg Aukas mining operation near Grootfontein. Tin production shows a relatively steep rise in production over the whole period and it reached its maximum production levels during 1978.

Examining table A.7 in the statistical appendix, one can see that a considerable number of minerals were mined in smaller quantities and at intermittent intervals. It happened frequently that certain mines were closed and re-opened again more than once during the period 1950 to 1985. Certain minerals, such as tin and semi-precious stones, are mined at irregular intervals mostly by small to medium sized mining operations, especially in the Karibib, Omaruru and Karasburg districts as well as in Damaraland. This provides a means of livelihood to many unemployed in these remote and relative underdeveloped regions, but if the undue speculation of mining grants, pirate mining and other undesirable mining practices usually associated with small-scale mining can be avoided and some regularity can be achieved, considerable more advantages will emanate from small-scale mining. In chapter three the employment of small-scale mining in mining development will be investigated in more detail.

2.6 THE VALUE OF MINERAL PRODUCTION

The value of mineral production is influenced by the volume of production discussed in the previous section and the realised price during each period which will be analysed in chapter seven. The combination of these factors leads to a typical exponential trend in the value of mineral production valued at current prices.

The total value of mineral production at current prices for the period 1950 to 1985 amounts to R10,4 billion (see table A.10). The individual minerals' contribution to the total value of mineral production at constant 1980 prices is set out in table 2.1, from which it appears that 51 mineral commodities were produced during the 36 year period. The total value of the mineral production at 1980 prices during this period amounted to R20,7 billion. Although the total mass of diamonds produced is far less than one per cent of the total volume of minerals, its value represents more than two thirds of the total value of all minerals. Uranium is the second most important mineral by value and contributed about 11 per cent to the total value, which is a remarkable achievement if one considers that the mineral was produced only during 10 years of the 36 year period. Next in line of the more important minerals are copper, lead and silver, whose combined value of production at 1980 prices amounted to R3,7 billion or 18 per cent of the total value or 83 per cent of the total value if diamonds and uranium are excluded.

This analysis therefore suggests that five of the 51 mineral commodities account for 96 per cent of the total value, and the remaining 46 minerals (or roughly 90 per cent of all minerals), account for only 4 per cent of the total value. Consequently, in contrast with the vast diversity of mineral occurrences in SWA/Namibia, the production is far from diversified and is concentrated among a few minerals.

Classifying the 51 minerals into commodity classes, which is done in table 2.2, the contribution of each class to the total value of production at 1980 prices for the period 1950 to 1985 is obtained. This classification shows that after diamonds, non-ferrous base metals are the most important mineral group, followed by uranium and by precious metals. Interesting and not commonly known is the fact that precious metals, by-products of the non-ferrous base metal mining industries, contributed almost five times more to the total value of production than did the combined value of non-metallic, ferrous base metals, semi-precious stones and rock production.

TABLE 2.1 - TOTAL VALUE OF MINERAL PRODUCTION, 1950 TO 1985

	MINERAL	PHYSICAL VOLUME OF PRODUCTION (Metric tonnes)	TOTAL VALUE OF PRODUCTION AT CONSTANT 1980 PRICES (Rand)	PERCENTAGE OF TOTAL VALUE	PERCENTAGE EXCLUDING DIAMONDS	PERCENTAGE EXCLUDING DIAMONDS AND URANIUM
1	DIAMONDS..............	9.185	13,930,828,907	67.31%	-	-
2	URANIUM OXIDE..........	38,112.367	2,237,905,976	10.81%	33.08%	-
3	COPPER................	1,630,215.000	1,783,059,591	8.62%	26.36%	39.39%
4	LEAD..................	3,361,041.000	1,351,065,185	6.53%	19.97%	29.85%
5	SILVER................	1,270.134	607,543,196	2.94%	8.98%	13.42%
6	ZINC..................	2,074,560.000	276,489,309	1.34%	4.09%	6.11%
7	TIN...................	38,792.000	242,910,640	1.17%	3.59%	5.37%
8	SALT..................	4,207,187.000	51,115,850	0.25%	0.76%	1.13%
9	TUNGSTEN..............	4,887.304	28,927,312	0.14%	0.43%	0.64%
10	GERMANIUM.............	79.797	25,670,695	0.12%	0.38%	0.57%
11	IRON PYRITE...........	868,755.000	23,213,134	0.11%	0.34%	0.51%
12	GOLD..................	1.275	20,878,439	0.10%	0.31%	0.46%
13	LITHIUM...............	178,480.000	17,676,026	0.09%	0.26%	0.39%
14	ARSENIC...............	54,593.000	16,781,888	0.08%	0.25%	0.37%
15	MANGANESE.............	568,925.000	12,465,147	0.06%	0.18%	0.28%
16	CADMIUM...............	2,230.000	11,282,774	0.05%	0.17%	0.25%
17	BERYL.................	5,659.000	8,570,271	0.04%	0.13%	0.19%
18	AMETHYST..............	1,290.000	6,418,140	0.03%	0.09%	0.14%
19	LIME/HYDRASOL.........	100,757.000	5,846,929	0.03%	0.09%	0.13%
20	TOURMALINE............	1.192	7,421,225	0.04%	0.11%	0.16%
21	TANTALITE.............	100.504	4,584,992	0.02%	0.07%	0.10%
22	LIMESTONE.............	334,008.000	4,271,962	0.02%	0.06%	0.09%
23	FLUORSPAR.............	130,800.000	2,919,456	0.01%	0.04%	0.06%
24	AQUAMARINE............	0.004	1,849,363	0.01%	0.03%	0.04%
25	SILICA................	205,812.000	2,047,829	0.01%	0.03%	0.05%
26	MARBLE AND ARAGONITE..	25,786.000	2,070,874	0.01%	0.03%	0.05%
27	REFRACTORIES..........	20,422.000	1,455,414	0.01%	0.02%	0.03%
28	IRON ORE..............	137,527.000	1,427,530	0.01%	0.02%	0.03%
29	SODALITE..............	795.400	953,510	.00%	0.01%	0.02%
30	MINERAL SPECIMEN......	36,428.000	983,920	.00%	0.01%	0.02%
31	WHITE QUARTZ..........	11,702.000	960,383	.00%	0.01%	0.02%
32	SODIUM COMPOUNDS......	11,373.000	867,215	.00%	0.01%	0.02%
33	ROSE QUARTZ...........	1,712.000	755,501	.00%	0.01%	0.02%
34	CALCITE...............	42,041.000	630,615	.00%	0.01%	0.01%
35	WOLLASTONITE..........	16,602.000	605,309	.00%	0.01%	0.01%
36	GRAPHITE..............	12,080.000	558,338	.00%	0.01%	0.01%
37	FELDSPAR..............	10,650.000	420,036	.00%	0.01%	0.01%
38	AGATE.................	461.454	438,381	.00%	0.01%	0.01%
39	MICA..................	5,379.000	354,422	.00%	0.01%	0.01%
40	SLATE.................	3,383.000	260,153	.00%	.00%	0.01%
41	CHALCEDONY............	68.407	135,446	.00%	.00%	.00%
42	AMAZONITE.............	62.807	94,211	.00%	.00%	.00%
43	COLUMBITE.............	28.984	92,169	.00%	.00%	.00%
44	BISMUTH...............	27.276	70,372	.00%	.00%	.00%
45	MICROLITE.............	0.449	50,454	.00%	.00%	.00%
46	GYPSUM................	2,750.000	44,303	.00%	.00%	.00%
47	GREEN QUARTZ..........	6.381	25,524	.00%	.00%	.00%
48	JASPER................	10.155	25,388	.00%	.00%	.00%
49	TIGER'S EYE...........	12.040	14,448	.00%	.00%	.00%
50	MOLIBDENITE...........	0.695	1,348	.00%	.00%	.00%
51	CAESIUM...............	76.286	763	.00%	.00%	.00%
	TOTAL FOR DIAMONDS	9.185	13,930,828,907	67.31%	-	-
	TOTAL FOR URANIUM	38,112.367	2,237,905,976	10.81%	33.08%	-
	TOTAL FOR OTHER MINERALS	14,108,829.544	4,526,305,378	21.87%	66.92%	100.00%
	TOTAL FOR ALL MINERALS	14,146,951.096	20,695,040,261	100.00%	100.00%	100.00%

SOURCE: Table A.7 and unpublished data from the Department of Finance.

TABLE 2.2 - TOTAL VALUE OF MINERAL PRODUCTION AT CONSTANT 1980 PRICES ACCORDING TO MINERAL COMMODITY CLASSES, 1950 TO 1985

COMMODITY CLASS	R MILLION	PER CENT
PRECIOUS STONES	13,931	67.32
NON-FERROUS BASE METALS	3,771	18.22
SOURCES OF ENERGY	2,238	10.81
PRECIOUS METALS	628	3.03
NON-METALLICS	81	0.39
FERROUS METALS	25	0.12
SEMI-PRECIOUS STONES ..	19	0.09
ROCK	2	0.01
TOTAL	20,695	100.00

SOURCE OF BASIC DATA: TABLE 2.1.
CLASSIFICATION ACCORDING TO TABLE S.1.

2.7 CONCLUSION

This chapter was informative rather than analytical in nature and gave a detailed description of the minerals occurring in SWA/Namibia, where they occur and in what quantities they are exploited. It was pointed out that in contrast with the vast diversity of mineral occurrences in SWA/Namibia, the production is far from diversified and is concentrated among a few minerals and among a few mines.

The long-term trend of the physical volume of mineral production shows a leaning towards a Gompertz-function, i.e. starting off with a period of rapid exponential growth, levelling off at a later stage and finally declining at a sharp rate. It was pointed out in chapter one, that this is the typical course of the exploitation of any natural resource under a government policy, which permits the rapid exhaustion of resources in a period of rapid growth and high living, followed by a collapse of the system because of the essential nature of the resources. This trend therefore raises the question, whether the rate of exploitation of SWA/Namibia's mineral resources was the result of government policy or rather lack of policy in which the rate was merely the consequence of external forces and influences, such as the demand, the price and the availability of mineral resources. From the discussion to follow in chapter eleven, it would seem that the latter was in fact the cause of this adverse trend, since no formal government policy exists concerning the rate of mineral exploitation. Except for diamonds where the government has limited authority in determining production quotas (though the system also has some shortcomings), no directives are given on the rate of production of other minerals, the methods of production or on the extent of private exploration.

The declining mineral production since 1978 clearly reveals the urgent need for a responsible minerals policy based not so much on the needs of producers, but more so on the needs of the economy and the country at large. Chapter one set out certain aspects of such a minerals policy and in the chapters that follow, reference will again be made to these policy guidelines and how they fit in with the SWA/Namibian situation.

The next chapter continues with the discussion of mineral production and its contribution to total production in the economy. Certain policy guidelines are again be spelled out regarding the optimal rate of exploitation and ways and means of reducing the overly dependence on the mining industry.

NOTE 1:
The sources consulted for the compilation of maps 2 to 5 are the following: Berger (1966); Claasen & Page (1978); FNDC (1979, 1981a, 1981b, and 1984); Kruparz (1972); McIver (1966); Van der Merwe (ed.) (1984); Page (1976 and 1980); Van Rensburg & Pretorius (1977); Schalk (1985); Seeger (1980); Söhnge (1967 and 1984); Odendaal-Commission (1964); Department of Economic Affairs (1950 to 1984); Planning Division, SWA Administration (1977); Geological Survey (1982) and Tsumeb Corporation Limited (1970 to 1983).

CHAPTER THREE

THE ROLE OF MINING IN DOMESTIC PRODUCTION

3.1 THE PRODUCTION ACCOUNT

In this section the production account of the mining industry for the period 1970 to 1985 is analysed. The output is divided into final outputs (mainly exports in the case of mining) and intermediate outputs, i.e. outputs which are used as inputs in other domestic production processes. Inputs are divided into intermediate inputs, i.e. local purchases and imports of materials and products from other industries, and primary inputs, i.e. the use of labour, natural resources, capital and entrepreneurship.

Table A.15 in the statistical appendix gives details of the annual production accounts for the period 1970 to 1985 and table 3.1 summarises these accounts for selected years. The gross outputs more or less follow a constant trend, i.e. on average 96 per cent of all mineral production is exported. Deviations from this average are mainly due to varied changes in inventories, for instance during 1976 when more than 10 per cent of total outputs was produced for inventory build-up or during 1978 when 3 per cent of the total output was drawn from inventories.

The composition of gross inputs is divided into primary and intermediate inputs. The average share in these gross inputs for the period 1970 to 1985 are 66 and 29 per cent respectively and the remainder is made up by indirect taxes. The higher the share of intermediate inputs and the lower the share of primary inputs in total inputs, the lower the direct contribution to the GDP. Figure 3.1 gives details of

FIGURE 3.1 - COMPOSITION OF INPUTS IN MINING

SOURCE: TABLES A.15 AND A.17 * AT MARKET PRICES

the composition of gross inputs in mining for the period 1950 to 1985, in which the ratio of primary inputs in total inputs or outputs may give a rough indication of the productivity in mining. (In sections

TABLE 3.1 - MINING'S PRODUCTION ACCOUNTS FOR SELECTED YEARS

PERIOD	GROSS INPUTS				GROSS OUTPUTS				
					FINAL OUTPUTS				
	INTER-MEDIATE INPUTS	PRIMARY INPUTS	NET INDIRECT TAXES	TOTAL	EXPORTS	CON-SUMP-TION	CHANGE IN IN-VENTORY	INTER-MEDIATE OUTPUTS	TOTAL
TOTAL MINING - R millions									
1970	24.6	103.0	7.4	135.0	127.2	0.0	5.9	1.9	135.0
1975	67.4	174.2	13.6	255.2	241.3	0.1	1.0	12.8	255.2
1980	253.2	630.0	51.9	935.1	908.4	0.2	17.2	9.3	935.1
1985	374.0	908.1	46.2	1328.3	1283.4	0.5	15.9	28.5	1328.3
1970-1985	2637.9	5990.3	422.6	9050.8	8696.0	2.6	180.4	171.8	9050.8
DIAMOND MINING - R millions									
1970	15.3	52.7	6.9	74.9	69.4	-	5.5	-	74.9
1975	19.4	122.5	12.7	154.6	156.4	-	-1.8	-	154.6
1980	44.5	364.6	49.8	458.9	446.7	-	12.2	-	458.9
1985	28.0	330.5	41.7	400.2	409.0	-	-8.8	-	400.2
1970-1985	501.1	3062.3	391.9	3955.3	3916.4	0.0	38.9	0.0	3955.3
NON-DIAMOND MINING - R millions									
1970	9.3	50.3	0.5	60.1	57.8	0.0	0.4	1.9	60.1
1975	48.0	51.7	0.9	100.6	84.9	0.1	2.8	12.8	100.6
1980	208.7	265.4	2.1	476.2	461.7	0.2	5.0	9.3	476.2
1985	346.0	577.6	4.5	928.1	874.4	0.5	24.7	28.5	928.1
1970-1985	2136.8	2928.0	30.7	5095.5	4779.6	2.6	141.5	171.8	5095.5
TOTAL MINING - Percentages									
1970	18.2	76.3	5.5	100.0	94.2	0.0	4.4	1.4	100.0
1975	26.4	68.3	5.3	100.0	94.6	.0	0.4	5.0	100.0
1980	27.1	67.4	5.6	100.0	97.1	.0	1.8	1.0	100.0
1985	28.2	68.4	3.5	100.0	96.6	.0	1.2	2.1	100.0
1970-1985	29.1	66.2	4.7	100.0	96.1	.0	2.0	1.9	100.0
DIAMOND MINING - Percentages									
1970	20.4	70.4	9.2	100.0	92.7	0.0	7.3	0.0	100.0
1975	12.5	79.2	8.2	100.0	101.2	0.0	-1.2	0.0	100.0
1980	9.7	79.5	10.9	100.0	97.3	0.0	2.7	0.0	100.0
1985	7.0	82.6	10.4	100.0	102.2	0.0	-2.2	0.0	100.0
1970-1985	12.7	77.4	9.9	100.0	99.0	0.0	1.0	0.0	100.0
NON-DIAMOND MINING - Percentages									
1970	15.5	83.7	0.8	100.0	96.2	0.0	0.7	3.2	100.0
1975	47.7	51.4	0.9	100.0	84.4	0.1	2.8	12.7	100.0
1980	43.8	55.7	0.4	100.0	97.0	.0	1.0	2.0	100.0
1985	37.3	62.2	0.5	100.0	94.2	0.1	2.7	3.1	100.0
1970-1985	41.9	57.5	0.6	100.0	93.8	0.1	2.8	3.4	100.0

SOURCE: Table A.15.

6.4 and 7.4.2 more accurate definitions of productivity in mining are discussed.) The trend in figure 3.1 shows that there was a slight increase in productivity during the period 1950 to about the middle 'sixties and that the productivity of the mining industry has since then declined at a fast rate, judging from the declining value added as percentage of total inputs.

Some marked differences occur on the input side of the two types of mining identified, viz., diamond and non-diamond mining. From table 3.1 it appears that for diamond mining, intermediate inputs as percentage of gross inputs averaged 12,7 per cent, and those of non-diamond mining amounted to 41,9 per cent. This ratio indicates that diamond mining is by far the more "profitable" form of mining than the non-diamond mining industries, owing to diamond mining's low treatment requirement.

Another striking difference between these two types of mining is the share of remuneration of employees in gross value added. In diamond mining it amounts to 19,5 per cent and in non-diamond mining it is 36,9 per cent. This aspect will be discussed in more detail in chapter six.

3.2 THE LINKAGE WITH THE REST OF THE ECONOMY

3.2.1 FORWARD LINKAGE

It was indicated earlier that the gross output of the mining sector may be divided into final and intermediate output. The final outputs of the mining sector are either exported, consumed or invested. The term "final" denotes that no further value is added to these outputs and that they do not re-enter the economy. The intermediate outputs on the other hand enter the industrial process of the country where further value is added to these outputs.

The size of mining's intermediate outputs in relation to its total outputs is a reflection of the industrial sophistication of an economy. In the South African mining industry this ratio amounted to 17 per cent during 1978 (Lombard & Stadler, 1980: 6), and it may thus be said that South Africa has achieved a considerable degree of industrial sophistication. With an average ratio of only 2 per cent in the case of SWA/Namibia, it is clear that the country has still a long way to go with its industrial development efforts. But, as will be ascertained later in this chapter, there is enough scope for industrial development based on the outputs of the mining industry.

From an estimated input-output table for 1980 (see table A.16 in the statistical appendix) the flow of the gross output may be followed through the industrial grid of the economy. The composition of mining's total output is summarised in table 3.2 [**Note 1**]. The total supply of mining products amounted to R954,9 million of which the local mining sector supplied R934,3 million. The balance consists of imported mineral products like metal concentrates for local custom smelting, (for re-exports), minerals for uranium processing, such as manganese and sulphide, and coal for local industrial purposes. Of this total supply, R924,8 million or 96,9 per cent is destined to satisfy final demand, of which exports constitute about 98,2 per cent.

TABLE 3.2 - OUTPUTS AND OUTPUT-COEFFICIENTS OF MINING, - 1980 -

SECTOR	OUTPUTS R'm	OUTPUT-COEFFICIENTS
Agriculture and fishing ...	0.9	0.00096
Mining	9.9	0.01060
Secondary industries	19.3	0.02066
Tertiary industries	-	-
TOTAL INTERMEDIATE OUTPUTS	30.1	0.03222
Private consumption expenditure	0.1	0.00011
Government consumption expenditure	0.0	0.00000
Gross investment	16.3	0.01745
Exports	908.4	0.97228
TOTAL FINAL DEMAND	924.8	0.98983
TOTAL DEMAND	954.9	1.02205
Imports	-20.6	-0.02205
TOTAL OUTPUTS	934.3	1.00000

SOURCE OF BASIC DATA: Table A.16.

The intermediate demand for mineral products amounts to R 30,1 million and is distributed among the different sectors as indicated in table 3.2. However, only R9,5 million or 31,6 per cent of this intermediate demand is met by locally produced mineral products. Incidentally, with the vast diversity of mineral occurrences in SWA/Namibia, it is ironic that the country is poorly endowed with the mineral that lends itself perfectly to local industrial uses, namely coal. Coal is one of the few minerals which is imported for use in electric power generation and for some other industrial uses such as heating and smelting.

Consequently, the forward linkage of local mineral output with other industries to the value of R9,5 million during 1980, is limited in its capacity for multiplied income generation. The present local use of mineral outputs are limited to: firstly, the use of lime and salt in agriculture; secondly, the inter-mine transfers of metal concentrates for smelting purposes; thirdly, the application of minerals like silica and lime stone in the smelting process; and, finally, the use of quarrying products in the road and rail construction industries. In addition, the Rössing uranium mine has recently begun purchasing iron pyrite from local mines for the manufacture of sulphur. If the same could be done with the local manganese resources which the mine also needs for the processing of uranium, but which are still imported at present, one small step in the direction of import replacement would have been taken.

Exports remain the mainstay of the gross income of mining, making this sector an exogenously governed generator of income in the economy of SWA/Namibia. The income generated by mining in the economy is therefore dependent on foreign demand and on foreign economic conditions. During economic boom periods in the industrialised countries, the mining sector may experience increased exports and/or increased unit prices of exports. This happened during the 'sixties and again during the late 'seventies. The value of the mining sector as an earner of foreign exchange will be discussed in more detail in chapter ten. In that chapter attention will also be focused on the exogenous factors that have major influences on the performance of the mining industry.

3.2.2 BACKWARD LINKAGE

The gross inputs of the mining sector have been distinguished as intermediate inputs and primary inputs, the former being goods and services either obtained from other domestic industries or imported from abroad, whereas primary inputs refer to the basic factors of production: land (or natural resources), labour, capital and enterprise. Payments for the use of primary inputs (or factors of production) represent a direct generation of income or what in national accounting terms is called "value added". This term literally refers to the difference (amounting to R681,9 million in 1980) between the gross value of output (R935,1 million) and the value of intermediate inputs of R253,2 million (cf. table 3.1). The sum of these differences or value added throughout the economy in its various industrial sectors, constitutes the gross domestic product (GDP) of the country.

The mining sector also has the capacity to generate income through use of intermediate inputs from other sectors. This income is represented by the primary input components of the gross value of intermediate inputs bought by the mining sector from other industries. For example, the electricity supply industry sold electricity to the value of R29,7 million to the mining sector during 1980. The primary input component of the electricity supply industry adjusted for import leakages on these sales amounted to R10,4 million, which means that by making use of only one industry's output, the mining industry, in addition to its own income, generated a further R10,4 million. Later in this chapter similar analyses will be presented for all the other sectors with which the mining sector has backward linkages.

The value added in mining includes an item which must be credited to the depreciation of capital equipment used. Although this provision represents a separate entity which is required for the replacement of capital stock, it is in practice added to the net value added component of inputs to constitute the so-called gross value added (GVA) of an industry.

Another item also appears on the input side of table 3.1, that of "net indirect taxes". This item refers to indirect taxes paid by the mining sector to the government, less any subsidies received by the the mining sector from the government. Indirect taxes are assessed on producers in respect of the sale or the purchase of goods and services (United Nations, 1968: 234). Diamond export duty, general sales tax and customs duties are examples of indirect taxes assessed on the mining industry and charged to the expense of production, and therefore appear in the production account of the mining industry. The income generated by the mining industry after deduction of net indirect taxes is measured "at factor cost", and the income generated before deduction of net indirect taxes is expressed at "market prices". In the multiplier analysis later in this chapter, the value added will be given at market prices.

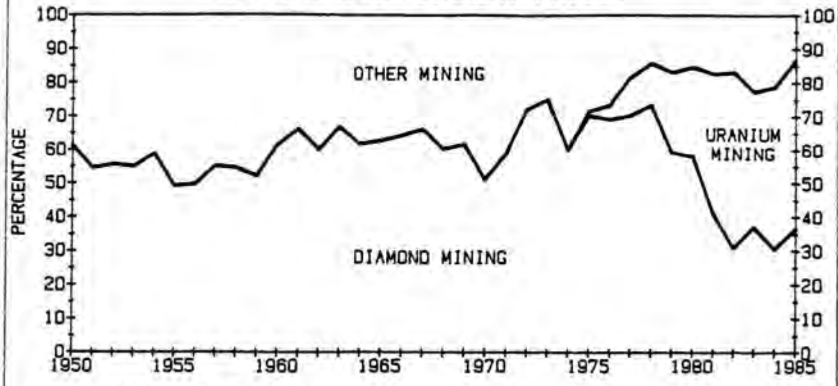
Finally, the net value added may be divided further into two main elements, namely the remuneration of employees and the net operating surplus. The former represents the remuneration of the work force employed in the mining sector. The operating surplus on the other hand is a blanket accounting concept, which covers the claims on the net value added by the owners of all other factors of production (land, capital and entrepreneurship). This surplus also includes an item, which was identified in chapter one as the "mineral rent" of the industry. The mineral rent should be seen as that part of the income that was brought forth by the exploitation of the mineral *per se* and should be distinguished from income generated by man-made inputs.

3.2.3 THE VALUE ADDED IN MINING IN RELATION TO THE GDP

3.2.3.1. THE VALUE ADDED AT CURRENT PRICES

At current prices the value added in mining grew from R17 million in 1950 to R908 million in 1985. Figure 3.2 indicates the relative importance of the different industries of the mining sector in total value added in that sector. The contribution of diamond mining to the total value added in mining ranged between 75 and 49 per cent during

FIGURE 3.2 - COMPOSITION OF GROSS VALUE ADDED IN MINING AT CURRENT PRICES



SOURCE: TABLE A.20

the period 1950 to 1978. In the subsequent period the value added in diamond mining as percentage of total value added in mining declined rather dramatically to reach the lowest ever contribution of 31 per cent during 1984. This was due to the slump in the international diamond market as well as the fact that uranium mining became the largest single contributor to the value added in mining ranging between 40 and 52 per cent since 1981.

From table 3.3 and figure 3.3 it appears that as percentage of the gross domestic product the value added in total mining ranged between 25 and 47 per cent over the period 1950 to 1985. The strong increase in the percentage contribution of mining to the GDP during the late 'seventies, was made possible mainly by the sharp rise in diamond

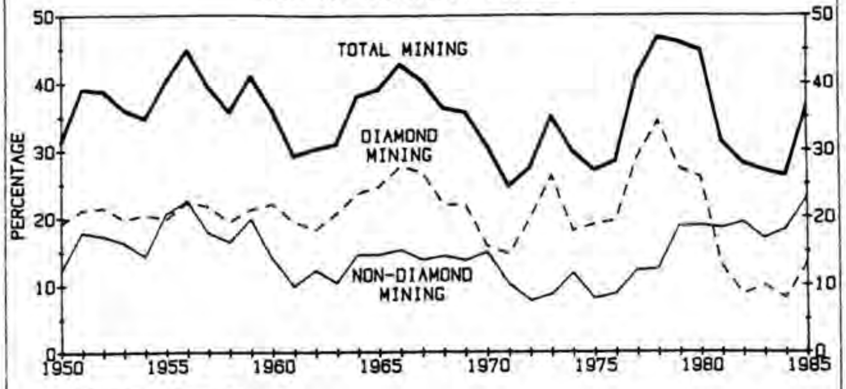
TABLE 3.3 - AVERAGE CONTRIBUTION TO GDP BY MINING

PERIOD	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING
1950-'59	20.7%	-	17.9%	38.6%
1960-'69	23.1%	-	13.5%	36.6%
1970-'79	24.5%	3.8%	8.3%	36.6%
1980-'85	12.6%	13.9%	5.5%	32.0%
1950-'85	18.1%	8.4%	7.9%	34.4%
MAXIMUM	34.3% (1978)	18.1% (1985)	22.5% (1956)	46.7% (1978)
MINIMUM	8.0% (1984)	-0.1% (1973)	4.7% (1982)	24.6% (1971)

SOURCE: Table A.21.

prices and the fact that the Rössing mine began uranium production during that period. The subsequent decline in the percentage contribution of mining to the gross domestic product, however, was mainly due to the slump in diamond production.

FIGURE 3.3 - MINING'S CONTRIBUTION TO THE GDP AT CURRENT PRICES



SOURCE: TABLE A.21

Diamond mining showed a fairly stable contribution to the GDP during the 'fifties and 'sixties of between 18 and 28 per cent. During the 'seventies, however, major instabilities in diamond mining's contribution to the GDP occurred. The all-time high of 34 per cent and the all-time low of 8 per cent were recorded within six years of each other, i.e. 1978 and 1984. This shows the importance of diamond mining, but at the same time demonstrates its vulnerability and the effect this has on the economy as a whole which relies heavily on it for export, employment, growth and government revenue.

The contribution to the GDP by the other forms of mining shows a much more stable trend than that observed in diamond mining. The changes that do occur in these industries' contribution to the GDP are affected more by the international business cycle than by sudden and sometimes inexplicable changes. Some of these aspects concerning international trade patterns will be discussed in more detail in chapter ten.

3.2.3.2 SOME STATISTICAL ASPECTS OF DEFLATING VALUE ADDED

To examine the real rates of growth in the GVA of mining, three possible methods of deflation of current production data may be used. The first is the so-called double deflation method. Gross output and intermediate inputs are deflated separately by appropriate price indices, and the value added at constant prices is computed as the difference between real gross output and real intermediate input. The second method makes use of Laspeyres type volume indices to extrapolate the value added in mining from the base year. The same indices, which were discussed in section 2.5 above, are used in this procedure. This means that the trend of GVA at constant 1975 prices is similar to that of the index of physical volume of mineral production. The only difference in the trend between these two time series, is the difference in the weights in the base year of the different mining industries. The third method, which has already fallen into disuse, merely uses the official consumer price index to deflate current value added data. This method, however, is not a good indicator of real production, because of the differences in consumer and production price movements, but it nevertheless gives one an indication of what the purchasing power of the GVA in terms of consumer goods would be.

The second method also has some disadvantages. The method assumes a constant relationship between intermediate and primary inputs and gross outputs based on the relationship in the base year. It assumes, in other words, a constant productivity ratio, i.e. intermediate input : gross output. The double deflation method overcomes these problems, because it deflates intermediate inputs and gross outputs independently and thus accounts for possible productivity changes.

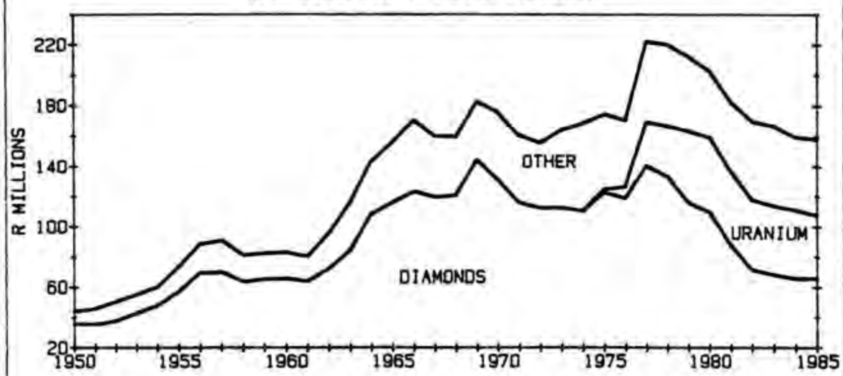
Under certain circumstances the two methods yield different results. When productivity increases occur in a certain industry, then method two underestimates the real value added compared with that of the double deflation method (method one). On the other hand method two over-estimates the real value added compared with that of method one, when productivity decreases occur. Both methods reveal identical results when the productivity in a certain industry remains fairly constant, despite price differentials that may exist between intermediate inputs and gross outputs.

From the discussion in section 2.5, it is evident that the choice of the base year is also very important. If in a certain industry the base year was one of very low productivity, but it has subsequently improved considerably, then method two tends to underestimate the whole time series. A similar situation has occurred in the case of the value added at constant prices of other mining (excluding diamond and uranium mining). Because method two was used for all the industries in the mining sector, and because 1975 was used as base year, this relatively underestimated time series will have to be kept in mind when it is discussed. In the next section and in chapter seven, however, estimates will be presented of the value added in mining using the so-called double deflation method discussed above. In that chapter the effect of price differentials of intermediate and gross outputs will be examined as well.

3.2.3.3 THE VALUE ADDED AT CONSTANT PRICES

The choice of the statistical method to be applied to estimate real value added in mining is very important in establishing the real value added or real income generated by mining. As was mentioned above, the technique used in this study to express value added in mining in real terms, is to extrapolate the base year GVA with the volume index, described above as "method two". This is also the method used in the official national accounting statistics. The results of these estimates are given in figure 3.4. The impression may be created that the importance of "other mining" is small compared to the total real value added in mining, but for reasons discussed earlier, this trend is more misleading than helpful, due to the statistical anomaly associated with the particular method of deflation and due to the fact that 1975 was chosen as the base year.

FIGURE 3.4 - GROSS VALUE ADDED IN MINING AT CONSTANT 1975 PRICES



SOURCE: TABLE A.22

Table A.19 in the statistical appendix gives details of the value added at constant 1975 prices using the different techniques of deflation, and table 3.4 gives a summary of this analysis. Another

TABLE 3.4 - GVA IN MINING USING DIFFERENT DEFLATING TECHNIQUES - R millions

YEAR	GVA AT CURRENT PRICES	GVA AT CONSTANT 1975 PRICES			
		1975 GVA extrapolated with volume indices *	Double deflation method	Adjusted for domestic terms of trade	Deflated with CPI
1970	103.0	175.4	186.3	172.4	154.0
1971	84.1	160.2	158.4	135.0	119.0
1972	112.7	155.1	150.7	160.1	151.3
1973	186.4	163.9	191.0	219.1	231.8
1974	169.1	168.2	140.6	181.2	190.9
1975	174.2	174.2	174.2	174.2	174.2
1976	215.1	169.9	146.2	191.5	192.4
1977	388.8	221.9	148.5	314.7	309.1
1978	531.3	219.7	224.8	395.0	382.0
1979	584.3	211.8	164.7	391.0	370.7
1980	630.0	202.3	149.1	357.1	355.3
1981	454.4	181.9	148.9	217.6	223.3
1982	465.6	169.1	138.0	192.6	197.7
1983	473.3	166.2	159.3	175.2	179.8
1984	510.4	159.0	119.1	170.8	177.7
1985	908.1	157.5	144.5	274.8	282.4

SOURCE: Table A.19. * OFFICIAL SERIES.

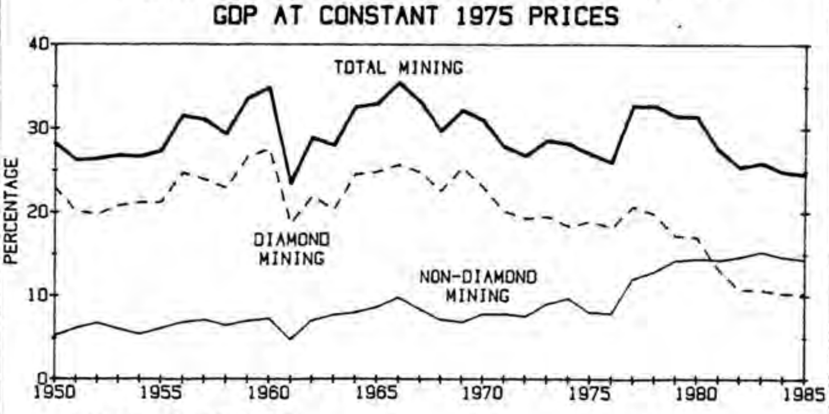
method is added to those already mentioned; this is an estimate of the real value added in mining adjusted for domestic price terms of trade.

This adjustment is made to the original real value added based on price differentials (GVA deflators) between mining and the rest of the economy. If prices in mining rise faster than those in the rest of the economy, the adjustment factor or the terms of trade in mining is larger than unity and thus it increases the real value added which was originally estimated. Conversely, the value added is decreased if prices in mining rise more slowly than those in the rest of the economy. Chapter seven gives a more detailed discussion of the role of prices in income determination.

From table 3.4 it appears that on average the double deflating method leads to the lowest real value added, whereas the method adjusting the real value added for domestic terms of trade yields the highest results. If the consumer price index is used to deflate the value added in mining, then the real value added in mining is higher than that of the official series. This is so because mineral output prices rose much faster than consumer prices did.

For the period 1950 to 1985 the GVA in mining measured at constant 1975 prices (using the official series) as percentage of the total real GDP was somewhat lower than the same ratio measured at current prices, owing to the fact that the deflator in mining is normally higher than that in the rest of the economy. These real ratios are presented in figure 3.5. The percentage contribution by mining to the real GDP, however, remained more stable over this period than with the nominal GDP. At current prices, the contribution ranged between 25 and 47 per cent, and at constant prices, the contribution ranged between 24 and 36 per cent, implying that the instability in GVA in mining at current prices was due not so much to fluctuations in physical production, but rather to fluctuations in unit prices of mineral outputs.

FIGURE 3.5 - MINING'S CONTRIBUTION TO THE GDP AT CONSTANT 1975 PRICES



SOURCE: TABLE A.22

Diamond mining's contribution to the real GDP reached its peak of 28 per cent during 1960, after which it declined slowly to reach the all-time low of 10,2 per cent during 1984 and 1985.

During the period 1950 to 1976 the contribution to the real GDP by non-diamond mining ranged between 5 and 10 per cent. Since 1977 this contribution increased sharply to reach a maximum of 15,3 per cent during 1983. The main factor contributing to this trend was the emergence of uranium production during 1976. This was the main factor which kept the contribution of total mining to the real GDP at a relatively high level amidst the declining share of the rest of the mining industry. If uranium mining's contribution to the real GDP is excluded, the contribution of other mining to the real GDP reached its lowest level ever of 17,7 per cent during 1984 after its contribution of twice as much during 1966.

3.2.4 THE VALUE ADDED INDIRECTLY TO THE GDP BY THE MINING INDUSTRY

3.2.4.1 THE MAGNITUDE OF MINING'S BACKWARD LINKAGES

As was mentioned briefly in section 3.2.2 above, the mining industry also adds to the GDP through its purchases of intermediate inputs from other industries in the economy. In this section this indirect contribution is re-examined and an attempt is made to quantify its significance. The quantification can only be an approximation, because of the complexity of inter-industry transactions, which is not fully brought to light by the compact input-output table used for this purpose.

The input-output table and its important applications are examined here in some detail. (See appendix one for the theoretical principles of the use of the input-output table.) Table 3.5 summarises the inputs of the mining industry [**Note 1**]. The intermediate inputs identified above are either produced locally or are imported directly or indirectly. From these inputs input-coefficients may be calculated, which reflect the ratios of the value of inputs from other particular industries and of primary inputs to the total input of the industry examined. From these coefficients it may be established that if the final demand for the total mining production, for example through exports, increases by say R1 million, the demand for products of secondary industries (including imported products) will have to increase by R159 000 (R1 million x 0,159), for those of the tertiary industries by R96 000 (R1 million x 0,096) and for those of the mining industry itself by an additional R11 000 (R1 million x 0,011), and agricultural outputs will increase by R4 000 (R1 million x 0,004. Furthermore, these increases in the supplies of the different industries will in turn need additional inputs from other industries. For example, to provide the secondary products mentioned above, worth

TABLE 3.5 - INPUTS AND INPUT-COEFFICIENTS OF MINING - 1980 -

SECTOR	INPUTS R'm	INPUT-COEFFICIENTS
Agriculture and fishing	3.9	0.00417
Mining	9.9	0.01060
Secondary industries	148.2	0.15862
Tertiary industries	89.7	0.09601
TOTAL INTERMEDIATE INPUTS	251.7	0.26940
Primary inputs	682.6	0.73060
TOTAL INPUTS	934.3	1.00000

SOURCE: Tables A.23, A.25.

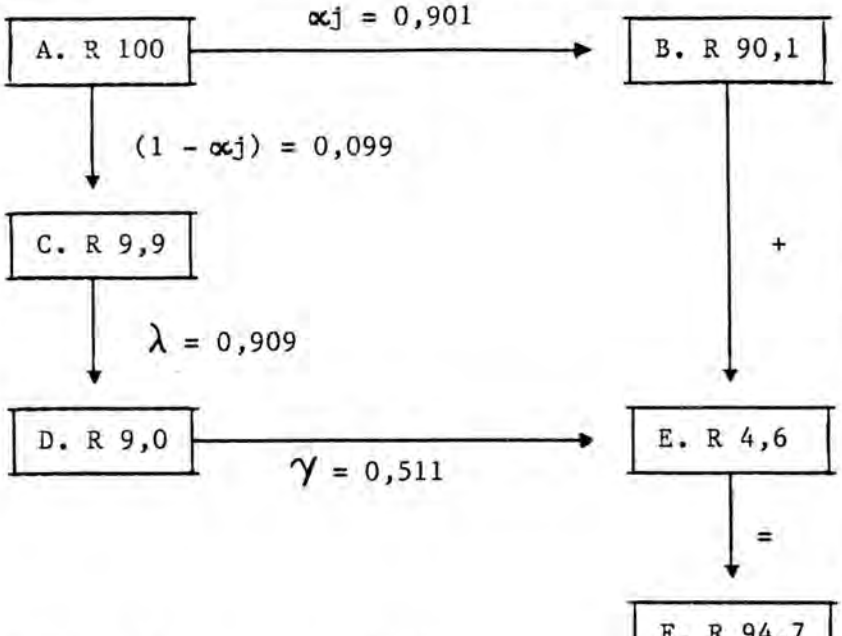
R159 000, the production of the industries concerned will have to increase by the amounts required, which in turn will stimulate production in various other industries. This process of incremental outputs will continue until the successive increments become infinitely small. These calculations lead to the determination of the so-called input inverse coefficients which gives an indication of the total additional outputs needed in each industry for an additional R 1 of mineral output.

Value is added to the intermediate inputs acquired by mining from other industries and again to the resulting intermediate inputs needed by those industries. The size of the value added for a particular industry depends on its value added coefficient, which is the ratio of value added in an industry to its total output. For mining this coefficient may be derived from table 3.5 above as 0,73. If the intermediate purchases of the mining sector are multiplied by each sector's value added coefficient after an adjustment is made to account for intermediate goods and services which are imported, then the total value added, directly and indirectly resulting from the R1 million increase in mining output may be established. Provision for import leakages must be made, since not all the demand for intermediate inputs is met by local sources. The value added shown above must therefore be adjusted for value added lost through the importation of certain intermediate goods and services.

3.2.4.2 VALUE ADDED INDIRECTLY

Although the calculations of the indirect contribution of the mining sector to the GDP through backward intermediate industrial linkages is complex, the basic principle behind these calculations is straightforward. The flow diagram for the diamond mining industry, depicted in figure 3.6, illustrates this.

FIGURE 3.6 - THE FLOW OF THE INDIRECT CONTRIBUTION TO THE GDP BY DIAMOND MINING



SOURCE: Tables S.3 and S.6.

The process starts at point A where for instance R100 million's worth of diamonds is produced. According to the input-output table, the value added coefficient (represented by the expression α_j, where j is the diamond mining industry) for the diamond mining industry is 0,901, so that the second stage in the process, i.e. B, notes the fact that R90,1 million is directly added to the GDP by the diamond mining industry. The third stage, C, indicates that R9,9 million (R100 million minus R90,1 million) was spent on intermediate inputs. This must be so, since the value of total outputs is equal to the value of total inputs. The critical stage of the flow chart is D, where the original outlay on intermediate inputs by the diamond mining industry itself is multiplied through the various iterations of the inter-industry transactions in the SWA/Namibian economy. The size of the <u>intermediate transactions multiplier</u> (λ) may be derived from the so-called inverse coefficients of the intermediate input relationships in the input-output tables. These coefficients are exhibited in table A.26. The method of derivation is explained in appendix two and is basically the same than that used by Lombard and Stadler, (1980: 17-20). The minor differences that do exist between the two methods are also explained in the appendix. This multiplier is expressed as a weighted inverse coefficient with respect to inputs of products of industries into diamond mining. This multiplier for diamond mining was calculated as 0,909 in 1980. The value of the gross domestic industrial transactions generated by R100 million gross output in diamond mining, therefore, came to R9,0 million (i.e. C x 0,909), as in D.

From these gross transactions a value added emerges, the coefficient of which is the weighted average of the sum of the value added coefficients of the individual industries concerned - weighted according to the importance of the industries in the transaction multiplier. Let this summed value added component be represented by γ. The size of γ for 1980 came to 0,511. This brings the flow chart to point E, recording the value added generated indirectly by diamond mining through its outlay on intermediate inputs as R4,6 million. Finally, the value added directly at point B = R90,1 million and that added indirectly at point E = R4,6 million is simply added together at point F = R94,7 million.

The same exercise is done for the other forms of mining, viz uranium mining and other mining and is presented in figure 3.7 and 3.8, respectively. From these flow diagrams it appears that:

(a) A R100 million increase in uranium exports will result in value added directly of R59,0 million and indirectly of R16,6 million; and

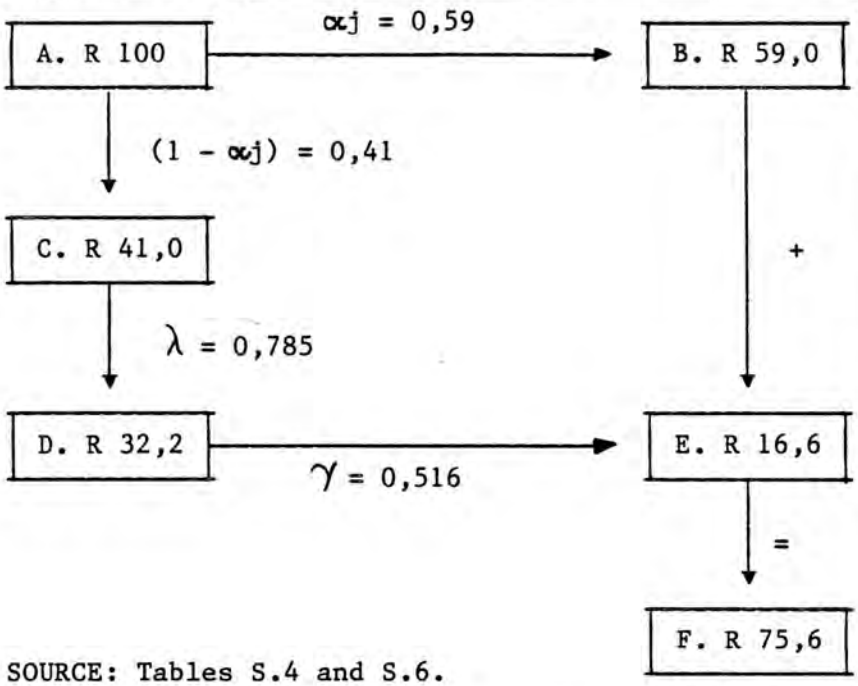
(b) direct value added of R52,8 million and indirect value added of R20,8 million arises from a R100 million increase in the output of other mining.

Although the total value added resulting from a R100 million increase in the output of diamond mining is higher than that resulting from a similar increase in the output of the other mining industries, the indirect value added is much higher in the latter industries. Therefore, it follows that uranium and other mining are much more adapted to add value in non-mining industries than is diamond mining. This may be ascribed to the fact that the intermediate inputs in relation to gross outputs of diamond mining (0,099) are smaller than those of uranium mining (0,41) and other mining (0,742).

Combining the effects of the three mining industries, the total value added resulting from a R100 million increase in mineral exports amounts to R84,6 million of which 13,6 per cent or R11,5 million is value added in sectors other than the mining industry.

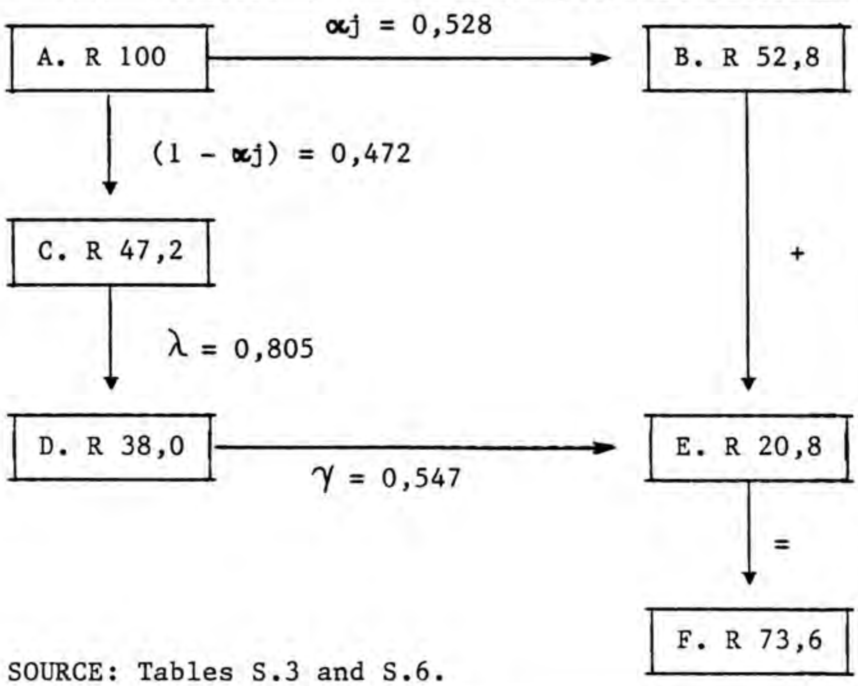
The import propensities of the industries, especially in SWA/Namibia, involved in the multiplication of activity through these backward linkages are important. In SWA/Namibia there is a considerable demand leakage through imports, particularly for industrial and services supplies. For example, the local content of total demand for manufactured goods of which the mining sector is a very large purchaser, is only 23,9 per cent. The demand leakage through imports in the last flow diagram (other mining) would be as follows: as a result of R100 million increase in the final demand for other mining

FIGURE 3.7 - THE FLOW OF THE INDIRECT CONTRIBUTION TO THE GDP BY URANIUM MINING



SOURCE: Tables S.4 and S.6.

FIGURE 3.8 - THE FLOW OF THE INDIRECT CONTRIBUTION TO THE GDP BY OTHER MINING



SOURCE: Tables S.3 and S.6.

output, total local output increases by R38,0 million (i.e. point C) and imports increase by R48,3 million, i.e. $C/\gamma - D$. The amount of gross value added which is lost to the economy by the extremely high import propensity, amounts in this case to R26,4 million, i.e. $E - C = F - A$.

The fact that the multiplier (λ) in the previous flow charts of all forms of mining is smaller than unity, shows that mining in SWA/Namibia is heavily dependent upon imports for its intermediate goods and services. The same multiplier for South Africa's mining industry is about 1,8 (Lombard & Stadler, 1980: 16), whereas an average 78 per cent of the total intermediate demand resulting from mining production is provided by their local industry. Only 44 per cent of the total intermediate demand resulting from mineral production in SWA/Namibia is satisfied by local sources. In the immediate future very little can be done to make the country more self-sufficient in the intermediate inputs of the mining industry, since most of these inputs are manufactured, like fuels, coal, cement and chemicals. Later in this chapter, however, attention will be given to potential mineral production if local mineral products were to be exploited and used for local production, not necessarily in the mining industry itself. Import substitution may be a feasible proposition since direct and indirect imports resulting from the mining industry's demand for intermediate inputs amounted to 26 per cent of total imports during 1980. The consequences of imports resulting from mineral production will be analysed again in chapter ten.

3.2.5 ESTIMATES OF TOTAL DOMESTIC VALUE ADDED ORIGINATING FROM MINERAL PRODUCTION

Having established the mechanism of how value is added indirectly through mining's acquisition of intermediate inputs, it is now possible to use this as basis for further computations of value added indirectly over a period of time. In the previous section it was illustrated by means of flow diagrammes that the indirect value added resulting from mining's intermediate inputs depends on the intermediate transaction multiplier (λ) and the weighted value added coefficient (γ). An indirect value added coefficient can thus be established, i.e. $\lambda . \gamma$ or E/C (from figures 3.6 to 3.8) and comes to 0,465 for diamond mining, 0,405 for uranium mining and 0,440 for other mining. These percentages also indicate losses of potential value added on intermediate inputs of 53,5; 59,5 and 56,0 per cent through import leakages in the respective industries. In appendix two (table S.6) these ratios are applied *ceteris paribus* to the intermediate inputs in mining since 1950. The results for the period 1970 to 1985 are summarised in table 3.6. From this it appears that the *total* domestic value added by mining in SWA/Namibia increased from a low of R103,7 million or 28,1 per cent of the GDP in 1971 to a high of R726,9

TABLE 3.6 - TOTAL VALUE ADDED* ORIGINATING DIRECTLY AND INDIRECTLY FROM MINERAL PRODUCTION

YEAR	R millions				AS PERCENTAGE OF GDP*
	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING	
1970	66.7	0.0	54.9	121.6	33.8
1971	60.8	0.0	42.9	103.7	28.1
1972	94.3	0.0	43.6	137.9	31.3
1973	156.3	-0.2	62.5	218.6	38.1
1974	129.4	-0.2	85.7	214.9	35.2
1975	144.2	2.6	71.1	217.9	31.6
1976	186.1	18.5	81.8	286.4	34.7
1977	332.4	76.6	90.9	499.8	48.6
1978	449.4	94.3	96.7	640.4	51.6
1979	413.9	178.7	134.4	726.9	52.3
1980	435.1	219.1	136.0	790.2	51.8
1981	229.5	237.7	116.2	583.3	37.4
1982	186.8	297.2	119.5	603.5	33.9
1983	212.8	238.4	151.1	602.3	32.4
1984	204.3	327.3	156.7	688.3	32.9
1985	385.2	534.3	191.7	1111.2	40.7

* Measured at market prices. SOURCE: Tables A.27; S.6.

million or 52,3 per cent of the GDP in 1979. After 1980 mining's direct and indirect percentage contribution to the GDP declined again to an average of 35,5 per cent.

It can thus be concluded that apart from mining's direct contribution to the income generated in the economy, mining also generates income indirectly through its acquisition of intermediate goods and services in its production process. With this linkage with the rest of the industrial sectors of the economy, the mining industry is able to lead and sustain the economy in a growth period with relative high prosperity. Conversely, when mining finds itself in a recessionary period, it tends to affect the rest of the economy negatively. An additional problem is caused by the typical fluctuations recorded in mineral production and in mineral output prices, which give rise to quite randomly oscillating movements in overall economic activity. This partially explains the vulnerable nature of the SWA/Namibian economy. In chapter five the significance of mining's indirect value added is discussed in more detail.

3.3 THE ECONOMIC CONSEQUENCES OF A COLLAPSE OF MINERAL RESOURCES

From the analysis thusfar, it is evident that mining has a major impact on the economy of SWA/Namibia. However, mineral production has been declining and the possibility of a major collapse of local mineral resources cannot be excluded. Such a collapse may be the result of the depletion of resources, the substitution of minerals by substitute or surrogate materials or a breakdown of imperfect markets, like cartels, as a result of international pressure. Some of these influences will be discussed in more detail in section 10.2. The question thus arises, what the consequences for the economy of SWA/ Namibia would be if the mineral resources of the country would experience any further setbacks.

The macro-economic effects of an increase in mineral exports has been indicated above. Similar, but negative multiplying effects will occur if mineral exports should decrease.

The diamond and uranium mining industries could be used to illustrate these effects, since they are the most susceptible to the adverse factors described above. The results of a halving of diamond and uranium exports are indicated in table 3.7.

TABLE 3.7 - EFFECTS OF A HALVING OF DIAMOND AND URANIUM EXPORTS DURING 1980 - R millions

DECREASE IN:	DIAMOND MINING	URANIUM MINING	TOTAL
MERCHANDISE EXPORTS	-223.4	-141.5	-364.9
As percentage of total	-19.7%	-12.5%	-32.2%
DIRECT VALUE ADDED	-206.7	-85.6	-292.3
As percentage of total	-13.5%	-5.6%	-19.1%
INDIRECT VALUE ADDED	-4.8	-21.4	-26.2
As percentage of total	-0.3%	-1.4%	-1.7%
TOTAL VALUE ADDED	-211.5	-107.0	-318.5
As percentage of total	-13.8%	-7.0%	-20.8%

SOURCE: Figures 3.6 and 3.7 and Table A.16.

The immediate result of the halving of diamond and uranium exports during 1980 would be a R 365 million loss in export earnings which amounts to almost one-third of the total merchandise exports. This would obviously have a substantial adverse effect on the balance of payments. Value added would show a decrease of R 319 million (amounting to 21 per cent of the GDP) of which the largest part would have been due to decreases in direct value added by the two mining industries involved. As noted before, the backward linkage of the mining industry is fairly limited. The decrease in the value added by non-mining sectors resulting from the halving of diamond and uranium exports, is estimated at only about 2 per cent of total value added.

The economic consequences in terms of employment, taxation and the balance of payments would be equally disastrous. Although these effects have not been quantified, they may be derived from the respective chapters dealing with these three subjects.

As was noted above, the indirect effects of a decrease in diamond and uranium exports on the value added by non-mining industries are limited, which might suggest that the adverse effect on the rest of the economy would not be critical. However, the static nature of the model used for the simulation exercise cannot accommodate the psychological effects of the scenario under discussion. The indirect effect may therefore be much more severe than that suggested by the above analysis. In fact, in the event of the extensive curtailment of mineral production in SWA/Namibia, there is simply no industry to replace mining.

In conclusion, it is possible to say that since mining is such an important source of income in the economy, the authorities tend to overlook the critical effects which will follow if some of the country's crucially important mineral resources become exhausted. It is therefore necessary to consider possible steps, which could be taken to mitigate the economic shocks resulting from curtailments of existing mineral production.

3.4 POTENTIAL MINERAL PRODUCTION

It has been concluded above that mineral production has a significant effect on income generation in SWA/Namibia. In chapter two it was also stated that a number of mineral deposits are not being mined at present. The exploitation of these resources could result in mining playing a much more important role in the economy. In addition, the economy and the tax base could also be diversified through the beneficiation of minerals which are presently exported in an unprocessed form.

Although a detailed investigation of potential mineral production falls beyond the scope of this study, it is nevertheless important to take notice of certain possibilities in this regard. The possible projects may be divided into import substitution, forward and backward integration and small-scale mining.

3.4.1 IMPORT SUBSTITUTING INDUSTRIES

Considerable reserves of limestone suitable for the production of cement occur in different areas of SWA/Namibia, as indicated on map 4 in chapter two. Cement factories were identified as priority projects at Windhoek, Swakopmund, Walvis Bay, Karibib and Usakos during the 'sixties (cf. Odendaal-Commission, 1964: 156), while lime deposits at Grootfontein and Keetmanshoop are also suited for cement manufacture.

Prospecting grants on the major occurrences, particularly on those at Karibib were awarded to South African cement producers, but the deposits were not developed since the South African producers obviously did not want any local competition. Recently, the development of a cement factory at Grootfontein was suspended for unknown reasons.

Cement manufacture in SWA/Namibia could be an economic proposition, but the small domestic market could prove to be an obstical. The value of cement imports during 1980 amounted to almost R20 million, which is about 2 per cent of total merchandise imports or about 6 per cent of the value of all buildings and construction works erected during 1982.

Another ideal opportunity for local mineral production is the exploitation of coal resources, particularly those in the Aranos region. In this case the prospecting grants are also held by South African companies. The coal deposits at Aranos are said to be low in quality and fairly deep. However, the occurrence of artesian water in the region makes the exploitation of the coal deposits economically feasible for electricity generation near the mine.

During 1980 the value of coal imports amounted to R17 million. Coal is mainly used for electricity generation and for other industrial uses such as smelting and heating.

SWA/Namibia has considerable known sources of rock and sand for building purposes. Sand for the construction of dams and roads as well as for use in plaster, concrete, mortar and bricks is usually available in sufficient quantities throughout the country. There are also numerous unexploited occurrences of natural dimension stone. Substantial accumulations of clay which could be exploited for the manufacture of burnt clay bricks are, however, quite rare, although a number of deposits suitable for the production of clay bricks have already been identified (Schall & Van Solms, 1984: 11-12). These prospects should be investigated further in order to obtain cheaper building materials and to establish further linkages between mining and secondary industries.

3.4.2 FORWARD INTEGRATION OF MINERAL OUTPUTS

Forward integration refers to the treatment of available products to a stage nearer to the final product before these are exported or used in the industrial process. An example of the successful forward integration in the local mining industry was the introduction of smelters at Tsumeb for the treatment of ore concentrates during the early 'sixties. These processes add value to the final product, increasing the export value of the product and if economically viable, also add value to the GDP. It is estimated that the value of final products can be increased by as much as four times through semi-processing and by as much as 20 times through full processing up to the metal ingot stage (Varon, 1975: 20). Developments along these lines should also be considered in the case of other minerals, provided the necessary economies of scale can be obtained. With the discovery of large new reserves of tin, there is enough scope to justify the construction of a domestic electrolytic tin plant. Output of the tin concentrates from the Uis mine presently provides about half of South Africa's Iron and Steel Corporation's (ISCOR's) requirements (Sparks & Murray, 1985: 52, 90). The economics of metal production are strongly influenced by the availability and cost of energy due to its high energy intensiveness. Energy is, however, not a limiting factor in industrial development in SWA/Namibia, due to the availability of cheap hydropower. This puts the country in a comparative cost advantage as far as smelting and refining are concerned.

Another example of forward integration is the sorting of diamonds before they are exported. At present the sorting, preliminary valuation and the consignment are all done in South Africa at Kimberley. This pre-sales "treatment" of the diamonds is an important industry, adding value to the final product. In fact, the cost of this treatment is valued at about 10 per cent of the preliminary value of the diamonds and has to be met by the local diamond mining industry at present.

The next step in the industrial process of the diamond is the cutting and polishing of the gem. The value of a cut diamond is increased at least four times from its uncut value. The establishment of a diamond cutting industry in SWA/Namibia has never been ventured, not because of a lack of interest, but because of a lack of encouragement or even active discouragement by the government. More often than not, when approached by interested diamond cutters, the government has used the excuse that a diamond cutting industry can "never" be a viable proposition in SWA/Namibia, owing to international competition and to the fact that cutters in countries like Israel, Belgium and Switzerland have large comparative advantages. Another argument used to discourage potential diamond cutters is the fact that diamond cutters in South Africa are heavily subsidised. The fact remains, however, that many countries, including Bophuthatswana and India, do not mine any diamonds at all, but have nevertheless established successful diamond cutting industries. The establishment of a diamond cutting and polishing industry in SWA/Namibia could be a payable proposition if it were encouraged by the government and by the diamond mining industry.

3.4.3 BACKWARD INTEGRATION OF INTERMEDIATE INPUTS OF THE MINING INDUSTRY

Backward integration refers to the production of products which are in demand as intermediate inputs by the mining industry. Considerable amounts of chemicals and explosives are consumed by the local mining industry and it may be economically viable to produce some of these products locally. Salt is one of the basic raw materials occurring in the country, which when exploited in sufficient quantities could be used in the manufacture of chemicals such as caustic soda, chlorides and hydro chloric acid. Industries could thus be created to produce some local inputs for the mining industry. In a sense, practical examples of backward integration have already been presented in the discussion of the local production of coal and cement. Both products are basic intermediate inputs for the mining industry. Mineral products that could be added to the list are manganese and limestone.

3.4.4 SMALL-SCALE MINING OPERATIONS

Apart from the attempts to develop large-scale mining and secondary industries linked to mining operations, attention should also be given to the development and improvement of predominantly small-scale mining operations. In the previous chapter it was pointed out that several minerals are mined on a medium or small scale, and that the exploitation of some mineral deposits is inconsistent resulting in a discontinuity in production, employment and capacity utilisation. Furthermore, owing to the intermittency of small-scale mining in SWA/Namibia, particularly with the exploitation of tin and semi-precious stones, little attempt is made to collect and verify production, sales and employment data. It is therefore difficult to assess the present state of small-scale mining in the country.

Small-scale mining in SWA/Namibia usually involves handpicking of minerals from waste dumps or from abandoned mining pits, but there are also fairly mechanised and efficient operations with good management. However, the typical small-scale mining operation is generally characterised by labour intensive and inefficient work methods, inefficient exploration of deposits, substandard work conditions, poor management and undependable output. In addition, some major problems are experienced with small-scale mining in general. Excessive fragmentation of the land prohibits the rational exploitation of the mineral resource, and the development of medium- or large-scale operations. Primitive and inefficient mining methods often mean mining only high-grade ores and poor recovery of the ore-body, resulting in a substantial wastage of the nation's resources (Bosson & Varon, 1984: 262-264).

Nevertheless, in certain areas small-scale mining can make an important contribution to the economy of SWA/Namibia by providing employment, very often in remote areas with no alternative source of employment. This form of mining requires special attention when formulating policies and drafting mineral and fiscal requirements. The promotion of these activities usually involves some government participation and sometimes even intervention. As a first step the government must have a good knowledge of the mineral potential in order to decide which deposits are suited for small-scale mining and which should be reserved for large-scale mining. If small-scale mining operations are ineffective owing to dispersion of a number of small deposits, the government should promote the establishment of consolidated mines in order to ensure continuity in production and employment.

Because the end product of a small-scale mine is usually a hand-sorted raw ore, it should be considered to establish regional or even mobile concentrators to upgrade the ore to a concentrate before it is sold. Establishing an equipment pool from which the equipment can either be rented out or contracted out with an operator deserves consideration (Bosson & Varon, 1984: 264-265). Small-scale mining of non-metallic mineral resources like clay, glass-sand, limestone and kaolin can even initiate the development of small-scale indigenous industry, such as brick factories, glass manufacturing and a ceramic industry. These activities can teach and develop technological skills just as well as more sophisticated installations (Kursten, 1983: 77-78).

3.5 CONCLUSION

This chapter investigated the significance of mining's production and income generation in the economy. It may be concluded that mining does have an important, yet cyclic impact on income generation. Mining contributes on average 32 per cent to the GDP, but during the 'seventies and 'eighties its contribution began to fluctuate wildly around this average between a low of 25 per cent in 1971 and a high of 47 per cent in 1978. It was further established that this cyclic nature of mining's contribution to the domestic income of the country is not only affected by fluctuating output levels, but more so by fairly volatile output prices - a fact that will receive more attention in chapter seven.

Through its purchases of intermediate goods and services, mining also generates income indirectly, which amounts to between 3 and 9 per cent of the GDP. This weak backward linkage illustrates how faintly the mining industry is integrated with the rest of the economy, supporting the view that mining in SWA/Namibia has remained an enclave, which is better integrated with the outside world than with the local economy. Mining's forward linkage is even more restrained, since only an insignificant fraction of mining's output is used in other secondary industries.

Since mining is such an important contributor to the GDP and since the mineral production has decreased sharply since 1978, owing to deteriorating reserves and other factors associated with the markets of especially diamonds and uranium, a situation was simulated whereby the diamond and uranium output was halved to establish the consequences of such possible developments. This exercise led to the conclusion that under such circumstances merchandise exports would decrease by more than 30 per cent and the decrease in direct and indirect value added would amount to more than 20 per cent of the GDP.

The dwindling mineral output and the dearth of linkages between mining and the rest of the economy calls for a reassessment of the minerals and economic policy of the country. Certain suggestions were made in order to lessen the dependence on mineral resources and to stabilise mineral production aimed at establishing linkages between mining and certain secondary industries and using the full potential of existing mineral resources, which still show considerable potential for further development. Apart from the development of large-scale exploitation of minerals indicated on the maps in the previous chapter, considerable advantages may also be gained by the mining and treatment of mineral products which at present are being imported, or by the forward and backward integration of mineral outputs and inputs of the mining industry. Finally, small-scale mining can also make a larger contribution to employment and to the development of skills. The government's consent and encouragement, at present still lacking, is, however, a prerequisite for the development of these industries.

The cyclicality of mineral production is also reason for concern as this has not only serious implications for income generation in the country, but also affects the balance of payments, public finance and employment situations. As was suggested in the previous chapter, a policy should be adopted which governs production according to the needs and circumstances of the economy and not according to the needs of the head-offices of multi-national corporations. For too long the country had to accept situations of windfall booms in one year only to fall back into a serious recession the next year. To a certain degree the market determines the fate of the mining industry, but some form government intervention is necessary to ensure that the mining industry does not over-react to these market signals. Production and sales quotas should be set by taking both present and future domestic and international economic conditions into account and thereby ensuring that the economy does not become a totally exogenous governed generator of income, but is stabilised and steered into a direction which is compatible with the authorities' macro-economic goals. With these policy directives it should be possible to determine, stabilise and possibly extend the future benefits of the country's mineral resources in the long run.

Having established the magnitude of mineral production and its impact on and significance to the economy, it is now possible to continue the discussion of the factors of production, which determine the mineral output. Investment and employment in mining is therefore the subject of the next three chapters.

NOTE 1:
The inputs and outputs of mining presented in the production account (tables 3.1 and A.15), are not comparable with those presented in the input-output table (tables 3.2; 3.5 and A.16), owing to the inclusion of imported mineral products in the input-output table, and owing to the different treatment of net indirect taxes and changes in inventories. In the input-output table provision is made for the actual incidence of indirect taxes and subsidies, whereas the production account only accounts for the actual payments of indirect taxes and receipts of subsidies. Only metals and minerals are considered as inventories of mining in the input-output table, whereas all stocks and stores of mining are regarded as inventories in mining's production account.

CHAPTER FOUR

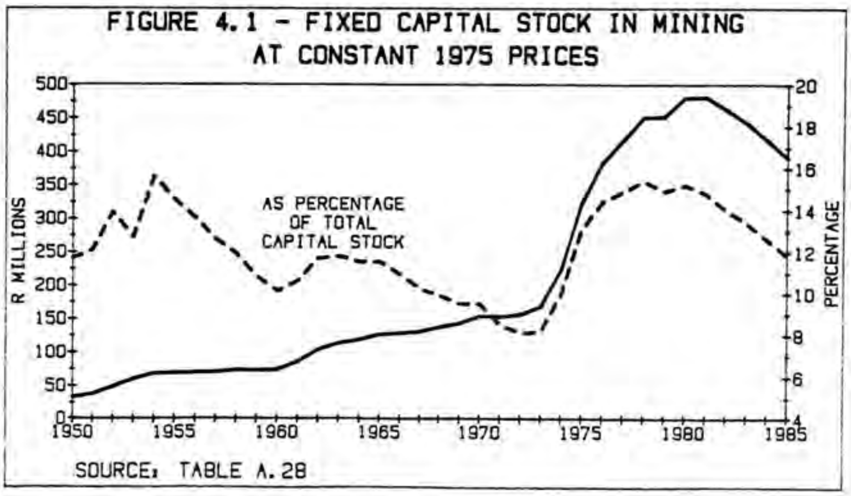
THE ROLE OF MINING IN DOMESTIC INVESTMENT

Labour, capital, entrepreneurship and natural resources are the four factors of production employed in the mining industry. This chapter deals with capital formation, investment or more specifically, fixed investment. The focus first falls on the growth in the capital stock; then attention is given to the employment of capital in relation to labour and in relation to output (the so-called capital/labour and capital/output ratios). The share of fixed investment in mining in relation to total fixed investment in the economy as well as the direct and indirect impact on the economy of this investment are also aspects to be dealt with in this chapter.

4.1 CAPITAL STOCK

4.1.1 THE GROWTH IN CAPITAL STOCK

Real fixed capital stock (i.e. accummulated real net fixed investment) employed in the mining industry is shown in figure 4.1. It appears that expansions in the fixed capital stock in mining took place during the early 'fifties and again during the early 'sixties, whereas the largest growth for the longest period occurred during the period 1973 to 1981, after which the capital stock began declining gradually. The large expansion during the 'seventies could be ascribed to the development of the Rössing mine, to social infrastructural developments (mainly residential buildings) on all mines, as well as to the renewed efforts for large scale prospecting in virtually all corners of the country.



The growth in the capital stock of mining is also reflected in the trend of fixed capital stock in mining as percentage of total fixed capital stock employed in the country as a whole. During the 'fifties

12,9 per cent of the total fixed capital stock of the country was employed in the mining sector. This share declined to 10,8 per cent during the 'sixties to rise again to 11,7 per cent during the 'seventies. This is a remarkable achievement for the mining sector considering the large infrastructural developments made by the public sector during the latter period, like the Ruacana hydro-electric scheme, roads, dams, schools and hospitals. In a mineral rich country like South Africa, mining employs only about six per cent of its total fixed capital stock (S.A. Reserve Bank, 1986: S-98).

Whether or not the growth in the capital stock is reflected in the output of the mining sector, will be discussed in the next section.

4.1.2 THE CAPITAL INTENSITY OF MINERAL PRODUCTION

It is important to analyse the relation between the capital stock and employment in mining to establish whether substitution has taken place. This may indicate the relative scarcity of these two factors of production. Similarly, the relation between fixed capital stock and real output not only indicates the capital intensity of the industry, but it also gives an idea of the return on capital invested, measured in terms of mineral output of mining.

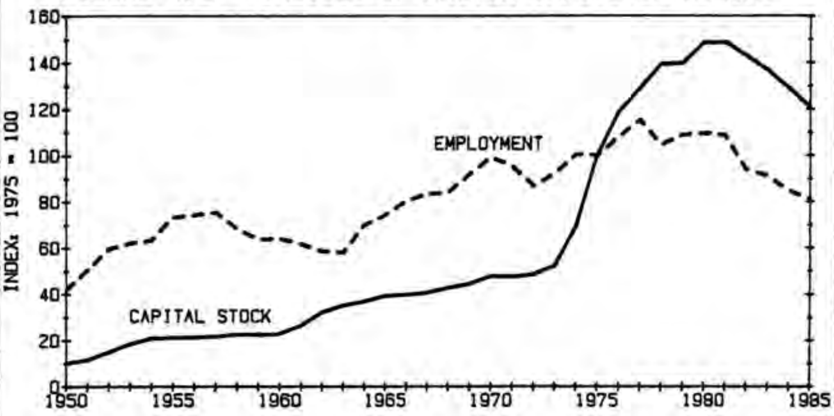
Capital intensity may be measured in terms of the amount of labour employed in relation to the amount of capital employed. This is expressed by the capital/labour ratio. The ratio for 1970, for example, stood at 0,5 which means that (with 1975 as base year where the two factors of production had a ratio of 1 : 1), for every "unit" of capital employed, two "units" of labour were employed. The capital/labour ratio of 1,4 during 1980, on the other hand indicates that for every "unit" of capital less than one "unit" of labour was employed. The annual capital/labour ratios are depicted in figure 4.2 from which it appears that there was a remarkable growth in the capital intensity of mining. The capital/labour ratio increased more than six-fold between 1950 and 1985. The trend in the capital intensity more or less coincides with that of the growth in capital stock in mining in the previous figure.

FIGURE 4.2 - INDICES OF CAPITAL/OUTPUT AND CAPITAL/LABOUR RATIOS IN MINING

SOURCE: TABLES A.32 AND A.33

Another way of looking at the capital intensity of the mining sector is to measure the trend of the factor inputs in mining separately. The capital and labour inputs of mining are depicted in figure 4.3 and it appears that these inputs more or less follow the same trend between 1950 to 1973, suggesting that capital and labour inputs during this period were more complementary to each other than in the period after that, when capital inputs rose much more steeply than the labour inputs. The mining industry thus became more capital intensive as is indicated by the increasing discrepancy between the capital and labour inputs since 1974. It is wrong, however, to argue that labour was substituted outright for capital, because major mining developments took place during this period, like the development of the Rössing uranium mine and plant, re-development of inactive mines, and housing and recreational projects, which in itself are quite capital intensive projects. Secondly, from a purely physical point of view, mines require more capital intensive technology as the lives of the mines progress and rich ore bodies become less abundant.

FIGURE 4.3 - INDICES OF FACTOR INPUTS IN MINING



SOURCE: TABLE A.33

Returning to figure 4.2, one can see that the capital/output ratio and the capital/labour ratio have very similar trends. An increasing capital/output ratio indicates that over time more and more capital is needed to obtain a certain level of mineral output. During the 'seventies, for example, ten "units" of capital were required to yield six "units" of mineral output, whereas during the 'sixties half the volume of capital was employed to attain the same return. Consequently it is clear that the efficiency of capital investment in mining is slowly decreasing as the existing mineral reserves are gradually being drawn down.

4.2 CAPITAL FORMATION

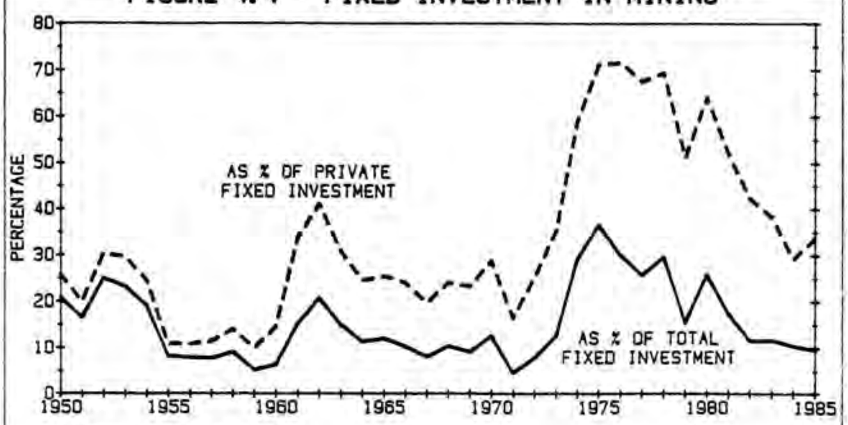
The growth in capital stock in mining is important not only for the increase in production capacity in the mining industry, but it also plays an important role as a source of "final demand" for other goods and services produced in the domestic economy. In this section the investment trend in mining is first analysed and then attention is given to the backward linkage of mining to industries responsible for the production of these capital goods.

4.2.1 INVESTMENT TRENDS

Real fixed investment in mining (at constant 1975 prices) for the period 1950 to 1985 is presented in table A.30 in the statistical appendix. Between 1950 to 1972, real fixed investment in mining did not show much variation in one direction or the other, and, except for some major capital projects mainly associated with the commissioning of the smelter at Tsumeb during the early 'sixties, ranged around an average of R12,3 million per annum. Since 1973, however, with the emergence of uranium mining and other physical developments in mining already mentioned, real fixed investment in mining showed vast increases, reaching its peak during 1975 of R121,2 million. During this period the fixed investment in non-uranium mining also showed marked increases. Unfortunately, these increases were only short-lived and except for another increase during 1980, which was mainly associated with the reactivation of the Otjihase mine, real fixed investment declined gradually to reach an exceptionally low level of R8,7 million during 1985, which is lower than the average for the period 1950 to 1972. The declining real fixed investment in mining during the 'eighties is therefore reflected in the poor production performance in mining over the same period.

The level of investment in mining should also be seen in relation to the total domestic investment in the economy expressed as percentage of the latter. The distinction is also made between the position of mining in <u>private</u> domestic investment and in <u>total</u> domestic investment; these are presented in figure 4.4.

FIGURE 4.4 - FIXED INVESTMENT IN MINING



SOURCE: TABLE A.31

Mining's share in total fixed investment remained more or less constant over the period 1950 to 1973 with the exception of the early 'fifties and 'sixties when increasing shares were recorded. Since 1973, however, the share increased from an average of 12,4 per cent during 1950 to 1972, to an average of 20,4 per cent afterwards.

Excluding fixed investment by the Rössing mine of R364 million during the period 1973 to 1985, mining's average share in total fixed investment was 11,7 per cent during the same period. As percentage of private fixed investment over the same periods, mining's share increased from 22,5 per cent to 52,6 per cent. (The increasing dichotomy between mining's share in private and in total fixed investment, which clearly shows up in figure 4.4, reflects the growing role of investment by the public sector).

4.2.2 BACKWARD LINKAGE EFFECT

Investment by mining in fixed capital goods has immediate effects on income generation, similar to those of mining's acquisition of intermediate goods from other industries, described in chapter three. From table A.31 it appears that during 1980, for example, R40,3 million was invested in the mining sector in the form of buildings and other constructions, and R72,1 million was invested in transport equipment, machinery and other equipment. How these purchases by the mining sector contributed towards increased value added by the other sectors will be discussed below.

Calculations made for capital outlays are similar to those made for current outlays in mining, but differ in that the industries responsible for the production of capital goods are now analysed instead of the mining industry. This means that a considerable number of industries' backward multipliers must be calculated and that these calculations must be made for each period to obtain a weighted coefficient for the amount of capital goods acquired by the mining industry. A summary of these calculations is presented in appendix three. These calculations show that the weighted value added coefficient (direct and indirect) of industries responsible for producing mining's capital outlays lies between 0,1918 and 0,2931, depending on the kind of investment goods acquired. The multiplier of the civil construction industry for example is 0,503, which is higher than the total weighted coefficient, owing to the high backward linkage and the relative high local labour content of output. Other sectors, however, have extremely low multiplying effects owing mainly to the high import content of their supply. Products of certain industries with no local content at all, do not initiate any backward multiplying effects. Given these coefficients, it follows that for every R100 million invested by the mining industry, between R19 and R29 million is directly and indirectly added to the GDP by those industries responsible for producing these goods.

Applying these multipliers to the actual investment by mining during 1980, the total value added resulting from mining's acquisition of capital goods amounted to R23,8 million, representing about 2 per cent of the GDP during that year.

These amounts vary considerably over time depending on the amount invested by mines and on the kind of assets acquired. During the middle 'seventies for example, when the Rössing mine was being developed, the value added resulting from total investment in mining reached its highest level during 1975 when R33,3 million or a little more than 5 per cent of the GDP of that year could be ascribed to the investment in the mining industry.

4.3 CONCLUSION

This chapter investigated three trends by relating investment in mining with the output and employment in mining and with investment in the economy as a whole.

Mining's share in the fixed capital stock gradually declined between the 'fifties and the early 'sixties, but, owing to major expansions in mining's production capacity, began to rise again since 1974 until 1981. After that, mining's fixed capital stock again started to decrease in real terms and as percentage of the total fixed capital stock. Mining's real gross value added follows a similar trend, both in absolute terms and as percentage of the GDP, suggesting that a positive relation exists between investment and output. This relationship was investigated in more detail by using the capital/output ratio, and it was ascertained that this ratio showed a continuous rise, especially since the 'seventies. This suggests that a certain level of investment yields an ever decreasing level of output, which implies that capital invested in mining is becoming less efficient over time, chiefly as a result of dwindling mining grades and reserves.

Consequently, this situation also has policy implications as far as the mining infrastructure is concerned. The government cannot accept the decreasing capital/output ratio, but should attempt to provide the necessary macro-infrastructure in areas that hold mineral potential and thereby opening up new areas for private exploration and development. The mining tax system in SWA/Namibia provides that capital expenditure (including the initial exploration and development outlays) can be written off against future profits. Although this is a commendable allowance, it can lead to superfluous capital expenditure which in turn could decrease the efficiency of capital investment in mining. For this reason each expenditure item should be considered carefully to ensure that only efficient expenditures qualify for this allowance. Details about exploration and mine development should therefore be made available to the tax authorities to enable them to decide whether funds were invested efficiently and to justify the postponement of the tax liability to some future date. Further tax implications are examined in chapter eleven.

Another important aspect of this chapter was the comparison made between the amount of capital invested and the amount of labour employed in mining. This analysis revealed similar tends than the capital/output ratio. It was estimated that between 1950 and 1985 the capital/labour ratio increased six fold, suggesting that mining became more capital intensive and less labour intensive during this period. The reasons for the increasing capital/output ratio mentioned above also apply to the rising capital/labour ratio.

Investment in mining also has linkages with other secondary and tertiary industries, and these linkages lead to income generation in industries supplying fixed capital goods to mining. It was estimated that for every R100 million invested by the mining industry, between R19 and R29 million is directly and indirectly added to the GDP.

Investment in fixed capital goods is a function of the past, the present and the perceptions of the future output levels. For this reason the investment trends in mining correspond roughly with its production trends. Owing to the political uncertainty and the decreasing mineral reserves, the possibility of increasing future mineral output is not perceived as very good, thus resulting in declining investment levels. On the other hand investment in mining is badly needed to increase the dwindling mineral production. It thus seems as if the mining industry is caught in a vicious cycle of declining output, leading to a decline in investment and followed again by an corresponding drop in output. A careful assessment of this situation should be made and the necessary policy measures should be implemented, designed not only to increase mineral output, but also to determine the magnitude of mineral reserves, making available this information to potential investors and providing incentives to attract domestic and foreign capital.

In the next chapter all the backward multiplier effects analysed in this and in the previous chapter, are applied to the mining industry's current and capital outlays for the period 1970 to 1985 to establish the aggregate value added originating from the production and investment activities of mining in SWA/Namibia.

CHAPTER FIVE

AGGREGATE CONTRIBUTION OF MINING TO THE ECONOMY

In chapters three and four the value added directly by mining and that resulting from the current and capital outlays in mining were estimated. In this chapter these values are consolidated to obtain an aggregate impression of the role of the mining industry as income generator in the country's economy.

5.1 VALUE ADDED IN RELATION TO THE GDP

The value added (at market prices) resulting directly and indirectly from economic activity in mining during 1980 (on which the multiplier analysis is based), amounted to R814 million or 53,3 per cent of the GDP. The composition of this amount is set out in table 5.1.

TABLE 5.1 - DIRECT AND INDIRECT VALUE ADDED ORIGINATING FROM MINING, 1980

VALUE ADDED	AMOUNT R ' m	SOURCE OF INFORMATION
Direct gross value added in mining	681.9	Appendix 2: Table S.6.
Gross value added in other sectors owing to current outlays by mining	108.3	Appendix 2: Table S.6.
Gross value added in other sectors owing to capital outlays by mining	23.8	Appendix 3: Table S.9.
Total gross value added resulting from activities in the mining sector ...	814.0	

If all these multiplier effects are applied (<u>ceteris paribus</u>) to the mining sector's production and investment activities for the period 1950 to 1985, the mining sector's aggregate contribution to the GDP may be estimated. The results for the period 1950 to 1985 are contained in table A.57 and are summarised in table 5.2 for selected years.

As percentage of the GDP the total value added resulting from mining in SWA/Namibia amounted to an average of 40,7 per cent and ranged between a minimum of 28,6 per cent in 1971 and a maximum of 53,3 per cent in 1978 and 1980.

5.2 FURTHER MULTIPLIER EFFECTS ON GDP VIA INCREASES IN FACTOR INCOMES

The grand total of GVA arrived above is in effect equal to the gross

TABLE 5.2 - VALUE ADDED AT MARKET PRICES ORIGINATING DIRECTLY AND INDIRECTLY FROM MINING IN SELECTED YEARS - R millions

YEAR	DIRECT VALUE ADDED	INDIRECT VALUE ADDED ON: CURRENT OUTLAYS	CAPITAL OUTLAYS	SUB-TOTAL	TOTAL VALUE ADDED
1950	18.5	2.9	0.9	3.8	22.3
1955	52.5	5.0	0.6	5.6	58.1
1960	43.2	4.9	0.9	5.8	49.0
1965	100.4	8.2	2.5	10.7	111.1
1970	110.4	11.2	3.6	14.8	125.2
1975	187.8	30.1	33.3	63.4	251.2
1976	238.2	48.2	22.6	70.8	309.0
1977	410.5	89.3	16.1	105.4	515.9
1978	582.3	58.1	20.7	78.8	661.1
1979	633.5	93.4	10.1	103.5	737.0
1980	681.9	108.3	23.8	132.1	814.0
1981	481.6	101.7	15.8	117.5	599.1
1982	491.1	112.4	10.1	122.5	613.6
1983	503.5	98.8	9.3	108.1	611.6
1984	536.8	151.5	7.7	159.2	696.0
1985	954.3	156.9	5.8	162.7	1117.0

SOURCE: Table A.57.

value of mineral production plus gross fixed investment in mining, both adjusted only for import content of the total output of each industry. The GVA may therefore be viewed as final outputs in the economy. Changes in these final outputs give rise to changes in the spending stream of the economy as a whole, which in turn leads to a multiplied effect on aggregate demand. This multiplied effect depends on the expenditure multiplier, which refers to the ratio of the change in income or output (the endogenous or dependent variable) to the change in the level of spending (the exogenous or independent variable). The final outputs generated by the mining industry represent the exogenous variable in the form of an injection into the spending stream of the economy and can initiate the multiplier process. The resulting multiplier effects, however, cannot be attributed to the mining industry alone, or rather mining's share in these effects cannot be distinguished, since all further multiplier effects are a function of the macro-economic structure of the economy as a whole.

The size of the multiplier depends on the size of leakages from the spending stream. The best way therefore to estimate the multiplier is to determine the total marginal leakages from the income flow. In the conventional model of the expenditure multiplier, leakages or withdrawals from the income flow in the economy are considered to be savings (S), tax payments (T) and imports (Z) [**Note 1**]. With every change in income, changes occur in savings, tax payments and imports.

The ratio between the change in savings, for example, and the change in income is called the marginal propensity to save (s). Similarly, the expressions marginal propensity to pay taxes (t) and marginal import propensity (z) are used. A rough estimation of the expenditure multiplier is then found by calculating the value of the expression:

$$\frac{1}{s + t + z - st} \qquad (5\text{-}1)$$

Estimates by means of linear regression have been made using data for the period 1970 to 1985. The savings propensity was taken to be the regression coefficient (s) of net private domestic savings (S), on net domestic income at market prices (Y). The import propensity (z) was regarded as the regression coefficient of imports of goods and non-factor services (Z) on gross domestic income at market prices (Y), and the tax propensity (t) was the regression coefficient of direct and indirect taxes (T) on the net domestic income at market prices (Y). The element st in equation (5-1) is necessary to eliminate the interaction between taxes and saving in the multiplier. In appendix four the method of calculation as well as the data used in the calculations are presented. The results of these calculations are the following:

S = a + sY	T = b + tY	Z = c + zY
a = 51,7	b = 12,6	c = 1,8
s = 0,099	t = 0,208	z = 0,68
r = 0,86	r = 0,96	r = 0,96

Given these estimates and equation (5-1) above, the expenditure multiplier may be taken as 1,034. In comparison with the multiplier of South Africa, which was estimated at 1,5, using the data for the same period (from S.A. Reserve Bank, Quarterly Bulletin, various issues) and identical definitions of income and leakages, SWA/Namibia's multiplier is extremely low. Although SWA/Namibia has lower savings and tax propensities than South Africa, SWA/Namibia's import propensity is exceptionally high (0,68 for SWA/Namibia as against 0,29 for South Africa). For this reason the multiplier loses most of its potential multiplying effects [**Note 2**].

According to the discussion in section 3.2.4.2, an autonomous increase in total local mining output of R100 million will result in an increase in value added of R84,6 million. Given the multiplier of 1,034, the economy will expand automatically until the increase in the GDP will reach about R87,5 million (R84,6 million x 1,034).

It should be mentioned, however, that the economy of SWA/Namibia could benefit considerably through decreasing its dependency upon imports and thus increasing the expenditure multiplier. In order to increase the multiplier from the present 1,034 to say 1,2, total imports of the country should decrease by at least 20 per cent.

According to the discussion above, the value added presented in table 5.2 must be adjusted to account for the additional multiplying effects which operate through the domestic expenditure transactions by multiplying the value added in table 5.2 with the coefficient 1,125 to arrive at the total value added in the whole macro economic structure. These adjusted amounts are given in table 5.3 together with their percentage shares in total value added in the economy (GDP). From this analysis the role of mining as income generator in the country becomes clear, judging from the fact that mining at times has made a percentage contribution to the income of the domestic economy of as high as 55 per cent. However, there have been fairly large fluctuations in the aggregate contribution by mining to the total GDP. The direct and indirect value added resulting from mining's participation in the economy, ranged between 30 and 55 per cent of the GDP. This gives a good impression of the vast impact which booms and recessions in the mining industry have on the economy as a whole. The movements of the income generated by mining therefore more or less dictate the business cycle of the economy.

TABLE 5.3 - AGGREGATE VALUE ADDED* ORIGINATING FROM MINING IN THE ECONOMY OF SWA/NAMIBIA

YEAR	R millions				AS PERCENTAGE OF GDP *
	DIRECT VALUE ADDED	INDIRECT VALUE ADDED	TOTAL VALUE ADDED	AGGREGATE VALUE ADDED #	
1970	110.4	14.8	125.2	129.5	36.0
1971	92.4	12.9	105.3	108.9	29.5
1972	122.8	17.9	140.7	145.5	33.1
1973	202.0	20.2	222.2	229.8	40.1
1974	183.8	44.4	228.2	236.0	38.7
1975	187.8	63.4	251.2	259.7	37.6
1976	238.2	70.8	309.0	319.5	38.7
1977	410.5	105.4	515.9	533.4	51.9
1978	582.3	78.8	661.1	683.6	55.1
1979	633.5	103.5	737.0	762.1	54.8
1980	681.9	132.1	814.0	841.7	55.1
1981	481.6	117.5	599.1	619.5	39.7
1982	491.1	122.5	613.6	634.5	35.7
1983	503.5	108.1	611.6	632.4	34.0
1984	536.8	159.2	696.0	719.7	34.4
1985	954.3	162.7	1117.0	1155.0	42.3

* At market prices. SOURCE: Table 5.1 and S.10.
# Multiplying total value added with 1.034

5.3 MINING AS INITIATOR OF ECONOMIC ACTIVITY

During 1980, the indirect value added resulting from mineral production and investment in the mining industry amounted to R132,1 million, or 18,7 per cent of the value added in business enterprises, excluding the mining sector.

Figure 5.1 depicts the indirect value added originating from mining's current and capital outlays as well as its contribution to the value added by business enterprises, excluding mining. The trend in the figure suggests that business enterprises other than mining became increasingly dependent on the well-being of the mining industry. The upward trend of this dependency has been particularly evident during the middle 'seventies, the reasons including the development of the Rössing mine and associated amenities, the large investment programmes of other mining industries and the buoyancy of the mineral market at that stage. The reversal of these events has, however, caused the opposite effect on the activities of business enterprises during the early 'eighties as indicated by the drastic decline in percentage share of the indirect value added by mining in total value added by the private sector. The decrease in fixed investment in mining was the major reason for the decline in the value added by business enterprises engaged in providing current and capital goods to mining.

FIGURE 5.1 - INDIRECT VALUE ADDED RESULTING FROM MINING ACTIVITY

SOURCE: TABLE A.57 * EXCLUDING MINING SECTOR

5.4 CONCLUSION

This chapter combined the three multiplier effects discussed so far. Apart from mining's direct contribution to the GDP, value is also added on current and capital goods supplied to mining by other secondary and tertiary industries. In addition to income generated through these <u>production processes</u> in the country, further value, though limited, is added through the <u>spending processes</u> resulting from mining's ultimate injection of final outputs into the economy. Thus, while mining appeared to have an immediate impact of about 35 per cent on the GDP in 1985, the various rippling effects through the economy have pushed that up to around 42 per cent, implying that about 7 per cent of the aggregate value added resulted indirectly from mining's participation in the economy. The large difference between mining's direct and its indirect contribution to the domestic income of SWA/ Namibia reflects the poor linkage between mining and the rest of the economy. In South Africa, for example, the indirect value added is higher than the direct value added in mining (Lombard & Stadler, 1980: 27). In the future development of the country a policy should be pursued to increase the indirect value added component of the total value added. As in chapter three, it is advocated that urgent attention be given to establish feasible industries that could provide inter-industrial linkages to and from mining.

Associated with the poor linkage, is the problem of high import leakages, which was identified as the principal limiting factor for the low multiplier. Reducing the economy's import dependence through import substitution and backward integration of the mining industry will create considerable greater multiplier effects in the economy by generating more income for each rand's worth of mineral output.

With this chapter the discussion of mining's role in production and investment has been concluded and the focus in the next chapter falls on the next factor of production, viz. labour.

NOTES:

1. In more complex interpretations of the expenditure multiplier, the marginal propensities are not assumed constant, but may vary according to structural changes in the economy and in socio-economic parameters. Furthermore, the monetary aspects, like interest rates may also be built into the model to provide for the possibility that rising interest rates may inhibit the multiplied increase in aggregate demand. Another possibility is that leakages from the spending stream may not stay "leaked", but may work their way back into the spending stream at some future date (Wonnacott, 1974: 78). In the multiplier defined for SWA/Namibia, provision was not made for leakages through an outflow of net factor payments, while transfers from the rest of the world was not implicitly built into the model as another possible injection into the spending stream. For the sake of brevity and to illustrate that some further value may be added through the spending stream, we suffice with the conventional model.

2. The low expenditure multiplier holds a serious implication for the SWA/Namibian economy. Any amount injected into the economy (for example by means of foreign aid) finds itself financing a little more than one transaction and then losing in impetus through import leakages. Because most imported goods originate from South Africa, the largest proportion of the leakages flows back to the South African economy, which supplies all the development aid at present. The implication of the low multiplier, therefore is that development aid at present does not have the intended effect on the economy of SWA/Namibia, but leads rather to further multiplication in the South African economy.

CHAPTER SIX

THE ROLE OF MINING IN EMPLOYMENT

In this chapter attention will be paid to employment in the mining sector. Both employment in the sector as a whole and in the individual industries of the sector will be analysed. In addition, the size of the labour force in mining in relation to the total labour force of the country and to mineral production will be examined. Particular attention will be paid to the remuneration of employees in mining.

In this chapter reference is made to "white" and "black" employment. This distinction is not made to stress racial differences, but rather to distinguish between more or less two different groups of employees in lieu of occupational statistics of the labour force in the sector.

6.1 EMPLOYMENT IN THE MINING INDUSTRY

Particulars of employment in the various industries, including the mining industry, during selected years appear in table A.34 and are summarised in table 6.1. The data show that mining is not a very large employer of the economically active population, but that it still remains an important source of employment in the SWA/Namibian economy. As an employer of the various population groups, the mining industry employed about 12,4 per cent of the 33 250 economically active whites and only 3,1 per cent of the 351 470 economically active blacks during 1985. In absolute terms, however, the black employment amounts to more than 70 per cent of the total employment in mining.

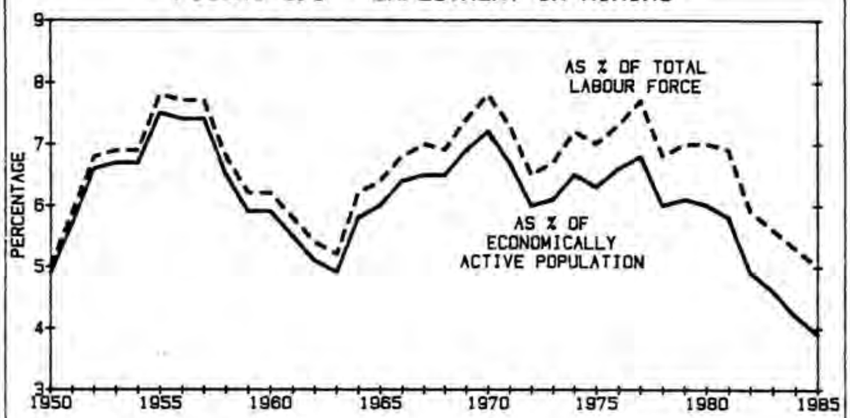
TABLE 6.1 - INDUSTRIAL CLASSIFICATION OF THE ECONOMICALLY ACTIVE POPULATION OF SWA/NAMIBIA

INDUSTRIAL DIVISION	1951		1960		1970		1980		1985	
AGRICULTURE	105586	65.3%	117297	57.7%	124699	49.3%	147964	44.0%	149370	38.8%
FISHING	1300	0.8%	1697	0.8%	1469	0.6%	1738	0.5%	1740	0.5%
MINING AND QUARRYING	9166	5.7%	11907	5.9%	18258	7.2%	20183	6.0%	14870	3.9%
MANUFACTURING	5437	3.4%	6737	3.3%	9736	3.9%	10273	3.1%	10880	2.8%
ELECTRICITY AND WATER	124	0.1%	909	0.4%	870	0.3%	1886	0.6%	2040	0.5%
CONSTRUCTION	5753	3.6%	12369	6.1%	9967	3.9%	9368	2.8%	8660	2.3%
COMMERCE	4867	3.0%	10637	5.2%	17254	6.8%	19359	5.8%	20510	5.3%
TRANSPORT AND COMMUNICATION	5168	3.2%	6546	3.2%	10194	4.0%	11754	3.5%	11300	2.9%
OTHER SERVICES	19966	12.3%	24337	12.0%	40897	16.2%	67621	20.1%	79020	20.5%
UNEMPLOYED AND NON-CLASSIFIABLE ..	4305	2.7%	10835	5.3%	19531	7.7%	46012	13.7%	86330	22.4%
TOTAL ECONOMICALLY ACTIVE .	161672	100.0%	203271	100.0%	252875	100.0%	336158	100.0%	384720	100.0%

SOURCE: Table A.34.

The employment in mining as percentage of the economically active population during the years presented in table 6.1, show fairly large fluctuations, which can be seen more clearly in figure 6.1. On average the employment in mining amounted to 6,1 per cent of the economically active population during 1950 to 1985. The large cyclic fluctuations in this share ranging between 7,5 per cent in 1955 and 3,9 per cent in 1985 are, however, reason for concern. Similar trends are present in mining's employment share of the total labour force, (defined here as the economically active population less the narrowly defined unemployed), except that the decline in the share during the 'eighties was not so pronounced, owing to the increasing problem of unemployment in the country.

FIGURE 6.1 - EMPLOYMENT IN MINING

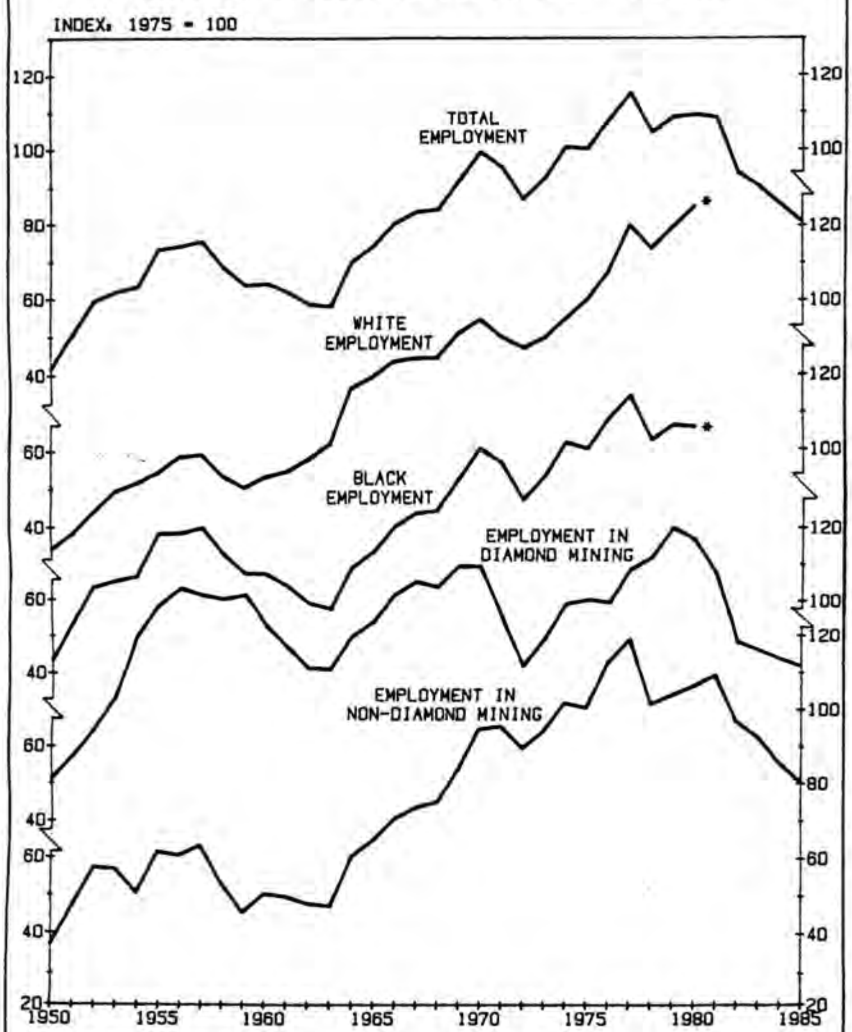


SOURCE: TABLE A.63.

Between 1950 and 1977 employment in mining grew at an average rate of 4,2 per cent per annum, whereas the annual growth in the economically active population amounted to 2,4 per cent. Over this period mining was in a good position to accommodate an increasing share of the annual addition to the labour market. The position after 1977, however, has been in total opposition to that before 1977. While the supply of labour kept on growing at a rate of 2,4 per cent per annum, mining decreased its labour force from 21 230 in 1977 to 14 869 in 1985, which amounts to an average decrease of 4,2 per cent per annum. This situation was an important contributing factor for the present high unemployment rate of more than 20 per cent compared to the rate of 14 per cent during 1980 and 8 per cent during 1970. The possibility exists, however, that unskilled ex-employees of the mining industry are in a better position to find employment elsewhere in the economy, due to the basic skills acquired in the mining industry.

Detailed figures of employment in the mining industry as a whole and in the diamond and non-diamond mining industries are given in table A.35 in the statistical appendix. Employment in the mining sector from 1950 to 1985 is depicted in figure 6.2, which shows a steady upward trend in employment despite declines in some years. For the period 1950 to 1980 total employment increased by an average of 3,6

FIGURE 6.2 INDICES OF EMPLOYMENT IN MINING



SOURCE: TABLE A.36 * DATA AFTER 1980 NOT AVAILABLE

per cent per annum, whereas white employment increased by 4,6 per cent per annum and black employment by 3,4 per cent per annum. A further distinction is made between the employment in diamond mining and in non-diamond mining. Over the entire period (1950 to 1985), the average increase in employment was 1,8 per cent for diamond mining and 3,1 per cent for non-diamond mining. The Rössing uranium mine, presently employing more than 15 per cent of mining's total work force, has added another boost to employment since the middle 'seventies. This boost in employment was particularly welcome at a time when many base metal mines either ceased or decreased production during the late 'seventies and early 'eighties.

Employment in total mining shows fluctuations which roughly correspond with production cycles of mining (compare figure 6.2 with figure 2.1). However, since the late 'seventies the sharp drop in diamond production was not accompanied by a similar sharp decrease in employment. The non-diamond mining industries on the other hand gradually decreased its labour force, despite the sharp increases in mineral output since the late 'seventies.

It should be noted that due to mining's capital intensiveness, this sector is not ideally suited for job creation in the economy. Small-scale mining, as was pointed out in chapter three, can, however, make a significant contribution to the lack of employment opportunities, provided that appropriate labour intensive methods of mineral exploitation could be devised for this purpose.

6.2 THE REMUNERATION OF THE LABOUR FORCE

In this section the focus will fall firstly, on the remuneration of employees in mining in relation to the remuneration in the national economy, secondly, on the share of remuneration of employees in the value added in mining and, finally, on certain aspects of salaries and wages in mining, like average earnings and the wage-gap.

Figure 6.3 depicts mining's remuneration of employees as well as the percentage share in the remuneration of all employees in the economy. From the analysis it appears that the remuneration of labour in mining showed moderate increases during the period 1950 to 1973, but that these have increased more rapidly since 1974.

FIGURE 6.3 - REMUNERATION OF EMPLOYEES IN MINING

SOURCE: TABLE A.61

Forces which were responsible for this rapid rise are the following:

- # the rise in domestic price levels; (consumer prices in SWA/Namibia rose at an average rate of 3,8 per cent during 1950 to 1973 while the average increase for the period 1974 to 1985 stood at 12,3 per cent);

- # the rise in the standard of living in general;

- # the active policy of salary parity adopted in the country since the middle 'seventies, which has lead to dramatic increases in wages for blacks, as will be seen in later parts of this chapter; and

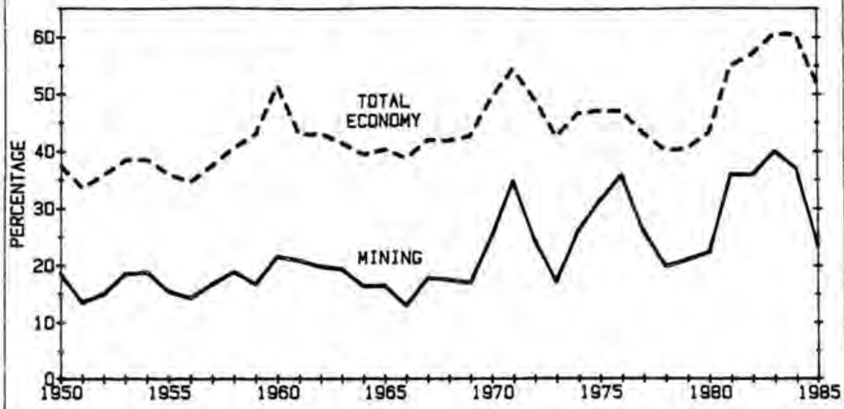
- # the practice of mining companies to pay higher wages to bid for the scarce skilled labour and to decrease labour turnover.

These wage increases have four important implications. Firstly, because the fast rise in mine wages relative to the rise in general wages, a wage dualism is created in the economy, which in turn is responsible for a continual interaction between the low- and the high-wage sectors. Wage increases in the high-wage sector as the wage leader often lead to wage rises in the low-wage sector and may thus give rise to cronic wage pressures, which in turn may aggravate the cost-push variety of inflation in the country. Secondly, because wage dualism encourages migration from the low-wage to the high-wage sector (Nankani, 1980: 8-9), it may be a major cause of the present high unemployment. Thirdly, wage increases in mining which work through to other sectors may lead to a deterioration in the competitiveness of domestic industrial and agricultural products (Bosson & Varon, 1984: 99). Finally, the high wages in mining as well as family accommodation, very good fringe benefits and training schemes being offered by major mines in an attempt to stabilise the workforce (von Kleist, 1981: 20), tend to create a labour elite or middle class which directs industry towards the production of middle class goods; this in turn leads to a high import content (Bosson & Varon 1984: 99).

Figure 6.3 also indicates that mining is a wage leader in the economy. During the period 1950 to 1973, mining's remuneration of employees stood between 14 and 18 per cent of that of the country as a whole. However, this share has begun to grow since 1974, reaching almost one quarter of total remuneration during 1977. The subsequent decline in mining's share in the remuneration of employees may be ascribed to the decline in mineral production (which can be seen in figure 3.4), and to the increasing employment in the public sector during this period. (During 1979 the public sector's share in the remuneration of employees stood at 32 per cent and this share grew to 48 per cent in 1985.)

It is also important to analyse the share of remuneration of employees in gross value added in mining. This ratio not only indicates the extent of labour inputs in mining, but it may also point to changes in the distribution of income generated by mining. Figure 6.4 depicts the ratio for mining as well as that for the economy as a whole. The figure shows that labour's share in value added of mining is lower than that of the total economy. This is mainly due to the inclusion of the mineral rent in the gross operating surplus of mining. Mining's labour ratio seems to have been quite steady during the period 1950 until the late 'seventies, when the labour share in value added ranged between 14 and 21 per cent. Since the 'seventies, however, the labour share in the value added of mining begun to increase very rapidly. During this period the average share stood at 28,2 per cent, whereas for the period 1950 to 1969 it stood at 17,2 per cent. The large fluctuations in this share observed in the 'seventies and early

FIGURE 6.4 - SHARE OF LABOUR IN GROSS VALUE ADDED



SOURCE: TABLE A.62

'eighties may be ascribed to sudden changes in the operating results of mining, affecting mainly the operating surplus part of mining's value added.

Labour's increasing share in the value added by mining has several causes. The first is the sharp increase in unit cost of labour in mining, which as will be evident in chapter seven, is one cost item showing the fastest growth. A second important cause lies in the recent practice by certain larger mining groups of not retrenching workers in the same proportion as expected and experienced production declines. Although this practice has serious implications for the productivity in mining (which will be discussed below), such a paternalistic personnel approach is deemed to be good politics by mining companies. The emergence of trade unions and the provision of channels for consultation between employees and management (Chamber of Mines, 1986: 15) is yet another reason for the increasing labour share in value added.

The third analytical approach is to look at mining's remuneration of employees from a micro point of view. Details of total salaries and wages in mining appear in table A.37 in the statistical appendix. Apart from the basic salaries and wages, a considerable part of the remuneration of employees consists of allowances, employer's contribution to personnel funds as well as remuneration in kind. The composition of remuneration of employees in mining is given in table 6.2.

It appears that with both white and black employees, payments in cash make up the largest part of the total remuneration of employees in mining. The composition of the kind of remuneration for whites has remained fairly constant over time, i.e. more than three quarters was paid in cash. The remuneration of blacks underwent some changes. During 1973 less than three quarters of the total remuneration was paid in cash, and about 26 per cent was remuneration in kind in the form of housing, hospital services, catering and recreation. It would

TABLE 6.2 - COMPOSITION OF REMUNERATION OF EMPLOYEES IN MINING - Percentages -

KIND OF REMUNERATION	1973		1975		1978	
	WHITE	BLACK	WHITE	BLACK	WHITE	BLACK
Salaries and wages	76.2	70.9	77.0	71.3	79.2	81.0
Contribution to personnel funds	5.8	3.1	5.8	2.3	6.0	3.4
Directors' fees	0.3	-	0.3	-	0.4	-
Remuneration in kind	17.7	26.0	16.9	26.4	14.4	15.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

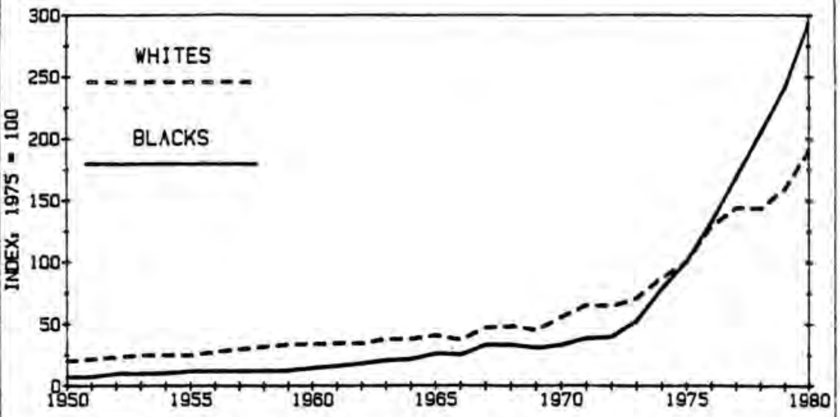
SOURCE: Central Statistical Services: Unpublished mining censuses for 1973, 1975 and 1978.

appear, however, that during the past few years blacks have begun to prefer remuneration in cash to remuneration in the form of free services; this reflects their private consumption choices. During 1978 for example, more than 80 per cent of the black remuneration was paid in cash.

Some mine workers prefer migrant employment. By leaving their families at home they retain their rights to communual land and seek to maintain cultural values which could be lost in an industrial environment (Chamber of Mines, 1986: 13). For this reason a substantial portion of the cash receipts by black workers flows to the regions from which the workers are recruited. During 1970 for example 75 per cent of the black labour force in mining originated from the Owambo speaking region. These cash flows to the home regions of the contract worker contribute directly and indirectly to economic growth and development and increased standards of living in such areas. As a result of this, subsistence agriculture is slowly being replaced by a cash economy in those regions. On the other hand, it could be argued that workers returning from the mines to their home regions may depend too much on their cash income, and thus make little effort to change the subsistence way of agriculture into a surplus producing agriculture. Since the country's minerals are depleting assets and since employment in mining has not been very stable in recent years, it would be advisable to direct development efforts in these regions towards agriculture rather than towards additional commercial enterprises. Bringing further trade establishments into those regions will only enhance consumption of the cash that was well earned on the mines [**note 1**].

Details of average earnings in the mining industry appear in table A.37 in the statistical appendix. These figures are presented in the form of indices in figure 6.5 from which it appears that average wages have increased very rapidly from 1973 onwards and that the wages of black workers in particular have increased substantially.

FIGURE 6.5 - INDICES OF AVERAGE WAGES IN MINING



SOURCE: TABLE A.37

It should be noted that the mining sector played a major role in closing the average black/white wage gap and in the increase in average earnings in general. Some calculations of the earnings in mining are present in table 6.3 with the black/white pay differential given in the first column. Information on salaries and wages for the respective population groups in mining are only available until 1980.

TABLE 6.3 - BLACK/WHITE WAGE DIFFERENTIALS AND NOMINAL AND REAL AVERAGE WAGES IN THE MINING INDUSTRY

YEAR	BLACK/ WHITE WAGE DIFFEREN-TIAL	INDICES OF AVERAGE WAGES IN MINING (1975 = 100)				CPI
		WHITES		BLACKS		
		NOMINAL	REAL	NOMINAL	REAL	
'50-'59	1 : 16.4	26.2	59.2	10.3	23.1	44.1
'60-'69	1 : 10.7	39.6	69.9	23.9	41.9	56.5
'70-'74	1 : 9.1	68.4	89.4	48.3	62.1	76.2
1975	1 : 6.4	100.0	100.0	100.0	100.0	100.0
1976	1 : 6.3	128.6	115.1	132.3	118.4	111.8
1977	1 : 5.5	143.9	114.4	165.3	133.8	125.8
1978	1 : 4.5	143.4	103.1	204.4	146.9	139.1
1979	1 : 4.3	159.8	101.4	241.4	153.2	157.6
1980	1 : 4.2	190.8	107.6	293.4	165.5	177.3

SOURCE OF BASIC DATA: Table A.37; CPI-data from the Department of Finance.

During the 'fifties and 'sixties the average wage gap was 1:16 and 1:11 respectively. The rapid closure of the black/white wage gap started during the 'seventies when it changed from 1:10 to 1:4 in 1980. The cause for this change was an increase in the annual average black mine cash wage from R369 in 1970 to R3265 in 1980 in nominal terms (an improvement factor of 8,8). In real terms (i.e. deflated with the CPI) the increase was from R552 in 1970 to R1842 in 1980, (an improvement factor of 3,3). If the wage differential would decrease at the rate it did between 1970 and 1980, the wage gap will _ceteris paribus_ be closed during 1985. However, it is obvious that with appropriate education and training for the black labour force in mining, this process can be enhanced considerably. On the other hand, it should be pointed out that many mines in the country have practiced "equal pay for equal work" for a considerable period of time, which implies that the wage gap calculated above refers to a large degree to wage differentials of different occupations. In this sense wage differentials will always exist.

The black/white wage gap of 1:4 in mining during 1980 compares well with the income differential of 1:7 between urban black and white males for the country as a whole during 1981 (Von Kleist, 1986: 162). As was suggested earlier, the high-wage sector usually works through to other sectors and the indications are that the mining industry's efforts to close the wage gap, has made a notable contribution to a more equal distribution of income and to a general upliftment of the population in SWA/Namibia.

6.3 EMPLOYMENT INDIRECTLY STIMULATED

The conclusion was reached in the previous chapters that the production of the non-mining industries depends to a certain extent on mining's purchases of intermediate and capital goods. Since labour is one element of the primary inputs thus generated in the economy, the income multipliers previously referred to have similar implications for the employment of labour. An employment multiplier, which gives an indication of the employment indirectly stimulated by mineral production has been estimated, using the same technique as applied in previous chapters on value added. Assuming fixed ratios between employment in individual industries and the value of gross output in such industries, the inverse coefficients of gross output (a_{ij}) adjusted for import leakages ($a_{ij} \times g_i$) may be multiplied by the employment / output ratios (n_i) to arrive at a gross employment multiplier ($a_{ij}.g_i.n_i$). This gross multiplier is calculated at 0,031 for diamond mining and at 0,067 and 0,118 for uranium and other mining respectively. The background to these calculations is presented in appendix five, where table S.14 indicates that an increase of R100 million in the gross value of mineral output would give employment to 2170 people in the mining industry itself and another 3800 in other domestic industries arising from the supply of intermediate goods directly and indirectly to mining. Given these multipliers, it is implied that the 1980 unemployment rate of 13,7 per cent (see Table 6.1) could decrease to 11,9 per cent given a R100 million or 10 per cent increase in mineral output. Conversely, if there were to be a

R100 million decrease in mineral output, 5970 employment opportunities would be lost, or, if put another way, the unemployment rate would rise to 15,5 per cent.

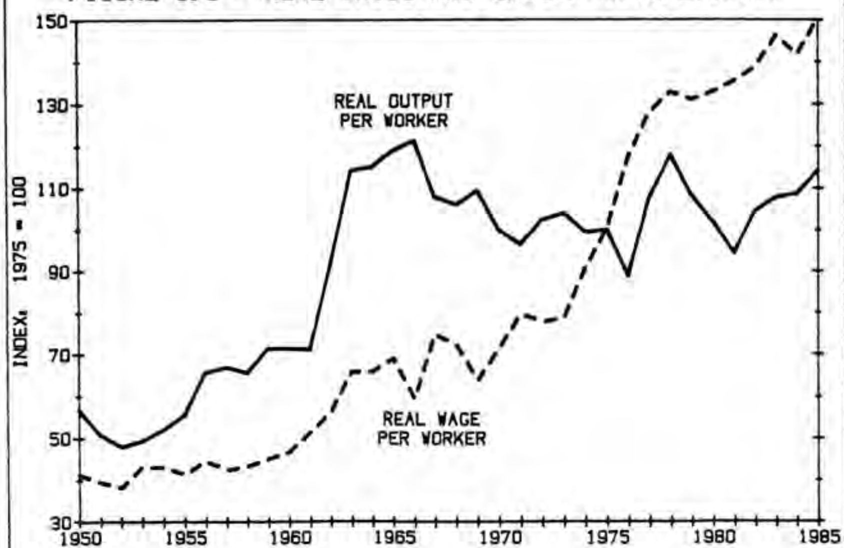
It should be pointed out, however, that the employment situation simulated above would only occur under the conditions of and under the assumptions made for the input-output table. In practice, a rise in production may not necessarily lead to an increase in employment or vice versa to the extent described above, owing to factors like the substitution of capital for labour or the utilisation of spare production capacity. The above estimates are given therefore only as rough indications of what effects changes in mineral outputs would have on employment.

6.4 WAGES AND LABOUR PRODUCTIVITY

In this section an attempt is made to determine whether labour productivity in mining has kept pace with the real remuneration per employee over the years. Labour productivity in this section is represented by the index of real output per worker, but it should be kept in mind that this ratio gives only a rough approximation of labour productivity, since it has been established that apart from labour, a host of other factors of production is responsible for the output of the mining industry. Average earnings on the other hand were taken to be the index of remuneration per employee, deflated with the consumer price index.

Figure 6.6 gives details of real average earnings and real output per employee, which reveals that the trend in real wages and real output per worker was fairly correlative during the period 1950 to 1973.

FIGURE 6.6 - REAL WAGES AND LABOUR PRODUCTIVITY



SOURCE: TABLE A.65

Since 1974, however, the interrelationship between the two series has been reduced considerably. During this period the growth in real wages has by far exceeded the growth in productivity. It may thus be concluded that labour productivity in mining kept pace with real wages in mining during the period 1950 to 1973, but that it has not increased to the same extent as have real wages since 1974. Labour productivity during the latter period is in fact increasingly levelling off.

In chapter seven, where more attention will be given to cost and price movements in mining, it will become apparent that since the middle 'seventies real wages in mining have begun to show a much better correlation with mineral output prices than with labour productivity, which implies that the remuneration of employees in mining has benefitted considerably from the rise in mineral output prices, notwithstanding the decrease in labour productivity.

6.5 CONCLUSION

Mining is not a very large employer of labour, but still remains an important source of employment. From the 'fifties until the mid-'seventies, mining was able to accomodate an increasing share of the annual addition to the labour market, but could not do so after that period and did in fact reduce its employment at a rate of 4,2 per cent per annum, while the economically active population grew at 2,4 per cent per annum. Consequently, mining contributed to the rising unemployment since 1977, which was brought about by the poor production performance, the increased capital intensity in mining and indirectly through mining's contribution to the wage dualism in the economy, which in turn has led to the migration of labour from the low to the high-wage sector.

Potentially, mining can still make and important contribution to reduce the growing unemployment in the country. It was estimated that a R100 million increase in mineral output would directly and indirectly result in the creation of 5970 employment opportunities. With the promotion of small-scale mining and the design of appropriate labour intensive methods of mineral exploitation, this ratio could be increased considerably. Moreover, projects to provide linkages between mining and secondary industries, which were discussed in section 3.4, could also make a valuable contribution to employment; not only in mining, but also in related industries.

In spite of mining's decreasing share in the total labour force, remuneration of employees in mining as percentage of total remuneration of employees began to increase during the mid-'seventies, which means that unit cost of labour in mining began to rise faster than in the rest of the economy. The reasons for this situation are the sharp increase in output prices in mining, the fact that labour had acquired more bargaining power through trade unions and more intensive training and the institution of equal pay for equal work earlier than other industries in the country. On the positive side this led to the general upliftment of mine workers, but on the negative side resulted in a wage dualism, which has serious consequences for unemployment and inflationary pressures from both the demand and the cost side. Since the late 'seventies, however, mining's share in total remuneration began to decline again as other sectors and particularly the public sector extended their share in the labour force and hence also in total remuneration.

Having surveyed certain micro aspects of employment in mining, it was possible to reach two further conclusions. The upsurge of mine wages, particularly in the black section of the labour force, led to a rapid narrowing of the black/white wage gap in mining - from 1:10 during the 'seventies to 1:4 during 1980. This made a considerable contribution towards a more equal distribution of income between the various population groups in mining's labour force and between labour and non-labour factors of production. The second conclusion was that labour productivity in mining did not keep pace with the sharp rise in real wages during the 'seventies. Whereas real wages began increasing at a sharp rate, labour productivity remained more or less unchanged. It was noted that mineral output prices rather than labour productivity have become the determining factor of mine wages; a process which in the long run can lead to inflationary pressures.

Having dealt with the principal factors of production in the mining industry, viz. labour and capital investment, the focus in the next chapter turns to the subject of prices and cost in mining, which, unlike the 'fifties, became an important determinant of the well-being of the mining industry during the 'seventies.

Note:

1. It is regretable that the First National Development Corporation of SWA/Namibia (FNDC) is still concentrating too much on development of the commercial sector in those regions from which most of the mine workers are recruited. During the financial year ended 31 March 1986, 75 per cent of the total turnover of the FNDC originated from the commercial sector and more than 60 per cent of its non-head office salaries and wages was paid to employees in commercial enterprises.

C H A P T E R S E V E N

PRICES AND COST

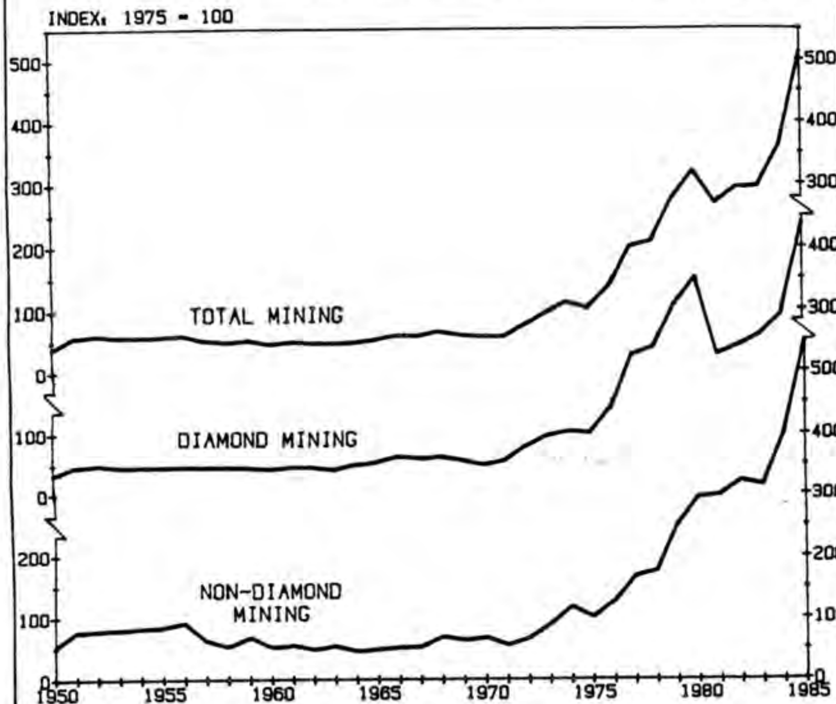
Whereas the previous three chapters dealt with the physical or "real" flows of goods and factors of production in the economy, this chapter will focus mainly on the prices and costs in mining and on how mining is affected by output prices and by costs of inputs. The question of prices was already touched on in chapter three when the methods of deflating the value added in mining were discussed. It will be recalled that four different deflators may be used to express mining's value added at constant prices, which clearly illustrates the importance of prices and the definitions given to it.

7.1 OUTPUT PRICE MOVEMENTS IN MINING

As a starting point it is useful to examine mining's output price movements. Output prices may be obtained by using the weighted price index of Paasche: $P_p(t) = (\Sigma\ p_t q_t / \Sigma\ p_o q_t)$. This index was used, since all the necessary data were already available from the analyses done in chapter two when the physical volume of production was dealt with. The Paasche price index is merely the gross value of production at current prices (contained in table A.10) divided by the gross value of production at constant 1975 prices (contained in table A.11). The results of these calculations are presented in table A.38.

Figure 7.1 gives a good indication of the output price movements in the different mining industries. During the period 1950 to 1971 very few price changes occurred in mineral outputs, but they have only begun to escalate rapidly since 1972. The overall price index of all minerals produced in SWA/Namibia increased five-fold from the 'fifties to the early 'eighties. Table 7.1 illustrates the price movements of certain important minerals during the period 1975 to 1985. The sharpest price increase was recorded with uranium, where prices rose more than ten-fold. Diamond prices showed an equally steep rise between 1975 and 1980, but declined sharply during 1981 and remained depressed since then. This trend in diamond prices is said to be the result of the slump in the diamond market for the quality of stones produced in SWA/Namibia. The depressed nature of copper and lead prices may also be deduced from the table. The fairly dramatic price increases during 1985 clearly shown in figure 7.1 and table 7.1 are not so much actual price increases, but reflect mainly the effect of the lower exchange rate of the rand against all major currencies. The effect of exchange rates on the performance of the mining industry will be dealt with in section 10.2.2.

FIGURE 7.1 - INDICES OF MINERAL OUTPUT PRICES



SOURCE: TABLE A.38

TABLE 7.1 - PRICE INDICES OF SELECTED MINERALS - 1975 TO 1985

YEAR	COPPER		LEAD		DIAMONDS		URANIUM	
	INDEX 1975=100	% CHANGE	INDEX 1975=100	% CHANGE	INDEX 1975=100	% CHANGE	INDEX 1975=100	% CHANGE
1975	100.0		100.0		100.0		100.0	
1976	116.7	16.7	121.1	21.1	139.3	39.3	213.9	113.9
1977	95.2	-18.4	167.0	37.9	225.3	61.7	328.9	53.8
1978	102.3	7.5	179.2	7.3	238.2	5.7	333.0	1.2
1979	139.7	36.6	300.4	67.6	305.0	28.0	384.9	15.6
1980	149.5	7.0	227.9	-24.1	349.0	14.4	458.1	19.0
1981	136.9	-8.4	195.8	-14.1	226.5	-35.1	513.1	12.0
1982	138.4	1.1	166.4	-15.0	241.3	6.5	621.1	21.0
1983	157.3	13.7	147.1	-11.6	258.9	7.3	572.4	-7.8
1984	173.9	10.6	195.5	32.9	291.6	12.6	734.7	28.4
1985	282.8	62.6	257.0	31.5	437.5	50.0	1059.5	44.2

SOURCE: Table A.38; unpublished data from the Department of Finance.

7.2 THE DOMESTIC PRICE TERMS OF TRADE BETWEEN MINING AND THE REST OF THE ECONOMY

Not only the mining sector experienced output price increases; with the emergence of inflation as an universal problem during the 'seventies, triggered off by the first energy crisis, prices of most other products began to rise as well. The question is, how the rise in mineral output prices compares with inflationary trends in the other sectors of the economy. Such a comparison may be regarded as the "domestic price terms of trade" between mining and the rest of the economy. The domestic price terms of trade merely refers to the value added deflator of mining divided by the GDP-deflator (excluding mining). Details of these calculations are given in table A.39. When the level of prices in the rest of the economy rises faster than that of mineral output, it implies that more mineral products must be sold by the mining industry to buy the same amount of goods and services from the rest of the economy. In such a case the terms of trade of mining will have deteriorated.

The domestic price terms of trade of mining with the rest of the economy are depicted in figure 7.2 which shows that throughout the period under discussion, with the exception of two years, mineral output prices were above those of the rest of the economy. The terms of trade in mining, however, slowly declined after the 'fifties until the early 'seventies, with minor improvements during the late 'sixties. As might have been expected with the dramatic rise in mineral output prices since 1972, the terms of trade in mining have since then also improved considerably. After a minor decline during the 1974/75 recession, the terms of trade in mining increased to about 185 in 1979. The present recession, which since 1981 has hit the mining industry in particular, and which saw mineral prices drop sharply, caused the terms of trade in mining to decline again to levels which prevailed during the 1974/75 recession. The two recessions are very similar as far as prices are concerned, except that diamond prices were much more adversely affected during the present recession than in the previous one.

FIGURE 7.2 - TERMS OF TRADE* BETWEEN MINING AND THE REST OF THE ECONOMY

SOURCE: TABLE A.39. * GVA DEFLATOR OF MINING DIVIDED BY GVA DEFLATOR OF REST OF GDP.

The comparison between prices of mining and those of the rest of the economy gives only a rough and indirect indication of the price relationship between the two sectors. The domestic price terms of trade merely indicates whether prices in mining have risen faster or slower than those in the rest of the economy. In theory, however, there is a more direct relationship between prices in mining and the rate of inflation in the country; this is effected through changes in the balance of payments and the money supply. In the event of an balance of payment surplus being accomplished by increased mineral export prices (an example of which prevailed during 1985), there is a net increase in the amount of foreign currency held by the country's banks and an equal net increase in the banks' demand deposits to the public. Consequently, the country's money supply increases due to the surplus in its balance of payments, giving rise to demand-pull inflation (cf. Shapiro, 1982: 295-298). However, since SWA/Namibia operates within the larger Rand Monetary Area (RMA) and does not have its own exchange rate and foreign reserves, the relationship between prices in mining and the rate of inflation in the country is not as directly nor as critically as was described above. Should SWA/Namibia quit the RMA after independence, the mining industry will become an important determinant of the money supply and thus of price levels.

There are, however, two price linkages functioning more directly between mining and the rest of the economy, which are both associated with the wage structure differentials between mining and the rest of the economy. First, should mining output prices rise more than output prices in the rest of the economy, wages paid in mining may also rise, which in turn may cause the domestic price levels to increase through demand-pull forces. The second linkage is through wage pressures that are initiated in the mining industry and then spread to the other sectors of the economy starting a typical cost-push spiral.

7.3 OUTPUT PRICE MOVEMENTS IN MINING IN RELATION TO IMPORT PRICE MOVEMENTS

As was said in the previous section, the domestic price terms of trade of mining gives only an indirect indication of price links between mining and the rest of the economy. The bulk of mineral outputs is exported and not used in other domestic industries, and most inputs in mining are imported; only a small proportion of the outputs of the rest of the economy finds its way to the mining industry.

When the prices of mineral exports are compared with the import prices, a meaningful indication is obtained of the purchasing power of minerals in the economy as a whole. This ratio may be referred to as the international price terms of trade of mining and is expressed as an index of mineral export prices divided by prevailing import prices. Calculations for the period since 1970 are shown in table A.40 and are summarised in table 7.2. For purposes of comparison the index of the price terms of trade for the economy as a whole (with and without mineral exports) is also presented in the table.

From table 7.2 it may be deduced that after 1971 mineral export prices have always been higher than prices of imported merchandise. From 1971 the terms of trade of mining grew rapidly, but deteriorated

TABLE 7.2 - INTERNATIONAL PRICE TERMS OF TRADE *

YEAR	TOTAL MINING	TOTAL EXPORTS EXCLUDING MINING	TOTAL EXPORTS INCLUDING MINING
1970	97.1	90.0	94.1
1971	91.0	95.6	93.3
1972	112.9	102.1	107.3
1973	129.7	106.4	120.2
1974	128.2	105.3	119.4
1975	100.0	100.0	100.0
1976	114.6	98.7	108.2
1977	156.1	88.4	133.6
1978	149.7	84.5	129.8
1979	168.2	82.8	140.6
1980	165.3	80.2	136.3
1981	124.8	83.4	108.6
1982	122.9	89.4	111.1
1983	108.6	89.5	102.8
1984	123.7	94.8	115.1
1985	149.2	73.5	124.1

* Export price index divided by import price index.
SOURCE: Table A.40.

during the 1974/75 recession. After that came another rapid improvement in mining's terms of trade to a level where mineral export prices rose more than 60 per cent above the prevailing import price level. Much of this rise of course was attributable to the considerable price increases in uranium experienced over that period. From 1980 to 1983 the international price terms of trade of mining decreased by about 34 per cent, which was caused mainly by the declining mineral prices (except for uranium) since 1981. During 1983 a slight improvement was observed in diamond prices as well as in prices of other minerals, but this time uranium prices showed a marked decline. The situation since then has improved considerably, which was the result of a steep rise in export prices of almost all minerals, which in turn was brought about by the poor external value of the rand. This improvement in the terms of trade of mining is also reflected in the terms of trade for the economy as a whole.

The role of mining in the overall terms of trade of the economy, is quite important when the terms of trade excluding minerals and those including minerals are compared. The terms of trade excluding minerals have shown rapid declines since the early 'seventies. If SWA/Namibia had been relying solely on its other traditional export commodities like red-meat, karakul pelts and fish, a certain volume of these exports during 1985 would have bought 26 per cent <u>less</u> imports (in volume) than during 1975. The situation for mineral exports during 1985 was that a certain volume of mineral exports could buy 49 per cent more volume of imports than it could during 1975. Since minerals make up more than three-quarters of total merchandise exports, the overall terms of trade of SWA/Namibia remained fairly stable even in the long recession which started during 1981. This recession had a very serious effect on the terms of trade of the country and on the mining sector in particular.

This analysis illustrates the overwhelming impetus of the mining sector in the country's foreign trade. The favourable terms of trade of the mineral exports are increasingly supporting the unfavourable terms of trade of non-mineral commodity exports. On the other hand this analysis also shows up the vulnerability of the economy owing to the sensitivity mineral commodity prices to changes in the international business cycle.

7.4 OUTPUT PRICE MOVEMENTS IN RELATION TO MOVEMENTS IN THE PRICES OF INPUTS INTO THE MINING INDUSTRY

In the second section of this chapter, the domestic price terms of trade in mining were examined and it was stated that this price comparison gives only a rough indication of price differentials between mining and the rest of the economy. The problem with this analysis is that mining does not sell its output only to the rest of the domestic economy, and it also does not obtain all its intermediate inputs from the rest of the domestic economy.

In the previous section the problem of the role that the rest of the world plays in domestic prices was overcome by examining mining's international price terms of trade. This method gives a very good indication of the price differential between mining and the rest of the economy, because mining's output is exported to a very large extent and its intermediate inputs are likewise imported to a large extent. The problem here, however, is that the price index of total imports may not be representative of price movements of all the intermediate inputs of the mining industry.

For this reason a more micro-approach is needed to estimate the price movements of inputs into the mining industry of both those imported and those acquired locally. The input price estimates were based on a Laspeyres type index and since South Africa supplies on average about 95 per cent of all SWA/Namibia's imports, production price indices of South Africa were used as approximations of input price data for mining. The weights for each mining industry's inputs were based on data contained in the input-output table for 1980 (table A.16). Details of these estimates appear in tables A.41 to A.43 in the statistical appendix. These estimates have many different uses. Firstly, the inputs into mining may be analysed individually to identify certain problem areas as far as price movements are concerned. Secondly, with inflation eliminated from the value of inputs and outputs, it is possible to determine the productivity of the mining industry as a whole by comparing the movements of real inputs with that of real outputs of the industry. Thirdly, comparisons may be made of the price movement of the inputs and the outputs of mining to establish whether the mining industry has been successful over time to obtain higher output prices than the prices of their inputs. Finally, with the previous calculations as basis, it is possible to present an updated version of the real value added in mining, using the so-called double deflation method which was discussed in chapter three. These four aspects will be discussed in more detail below.

7.4.1 PRICE MOVEMENTS OF SELECTED INPUTS

One use of the analysis of price movements makes it possible to identify certain inputs whose prices have risen more steeply than the average price increases of intermediate inputs. Table 7.3 gives an abstract of the input price movements of certain selected inputs, from which it appears that over the period 1962 to 1985 the unit price of labour has risen more than twice as fast as that of intermediate inputs in mining. As was suggested in chapter six, the black labour charges in particular have risen dramatically since the late 'seventies. The danger of this situation, where the unit price of labour increases faster than that of the average price level in the economy, is apparent. This trend in the long run leads to a wage-price spiral in the economy, which, apart from the effect of imported inflation is one of the reasons for the high rate of inflation in SWA/Namibia. Inputs whose prices have risen faster than those of the average input price, are electricity, petroleum products and metal products, excluding machinery and equipment.

TABLE 7.3 - PERCENTAGE INCREASE IN UNIT VALUES OF INPUTS IN THE MINING INDUSTRY - 1962 TO 1985 -

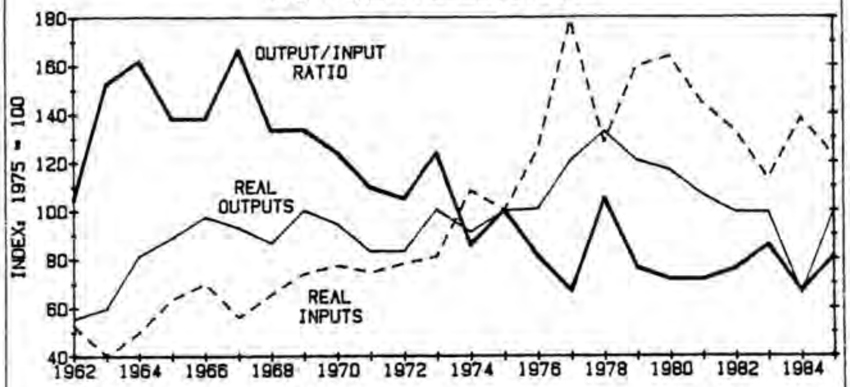
Remuneration of employees		1403 %
Intermediate inputs		697 %
Of which:	Petroleum products	1018 %
	Electricity	924 %
	Services	753 %
	Metal products, excluding machinery and equipment	694 %

SOURCE: Table A.41 to A.43 and A.45.

7.4.2 PRODUCTIVITY IN MINING

Having determined the price indices of inputs and outputs, it is now feasible to establish real or physical input and output trends, which in turn can be applied in an effort to arrive at the interesting and important subject of real productivity in mining. The source of such data was obtained from table A.40, the calculations are presented in table A.64 and the results are graphically depicted in figure 7.3. The inputs are taken as the real intermediate inputs plus the real labour inputs.

FIGURE 7.3 - INDICES OF REAL INPUTS AND OUTPUTS AND REAL PRODUCTIVITY



SOURCE: TABLE A.64

Comparing the real inputs with real outputs in mining, it is evidenced that inputs increased much more rapidly than did gross outputs, implying that on average a decrease in the productivity in mining was recorded during the period 1962 to 1985. The ratio of the two series clearly indicates this deterioration in productivity. For the period 1962 to 1969 the average input/output ratio stood at 1:3. It decreased to 1:2 for the period 1970 to 1979 and stood at about 1:1,5 during the period 1980 to 1985. This trend suggests that while one "unit" of input was yielding three "units" of output during the 'fifties, it was only yielding half the output during the 'eighties. This declining productivity ratio does not necessarily mean that mining methods and labour are becoming unproductive in the normal sense of the word; it does, however, mean that mining in general is becoming less productive, owing essentially to the exhaustible nature of minerals. As the ore grade is deteriorating, more intensive mining methods have to be employed, resulting in declining input : output ratios. This is because marginally more inputs are employed over time to produce a given volume of mineral output. Examining the two inputs involved, it appears that mainly intermediate inputs have recorded this increasing trend in relation to the output. Labour inputs, as was established in section 6.4, have remained more consistent with the outputs in mining, because with declining output levels, labour is relatively "easy" to retrench. It is, however, not always possible to curtail intermediate inputs proportionally to output declines, because a large part of the operating cost in mining consists of fixed or over-head expenditures. In addition, the increased capital intensity of the mining industry is another reason why intermediate inputs have shown such a rapid increase in relation to total outputs in mining. The higher the capital intensity, the higher the maintenance and operating cost of the capital equipment.

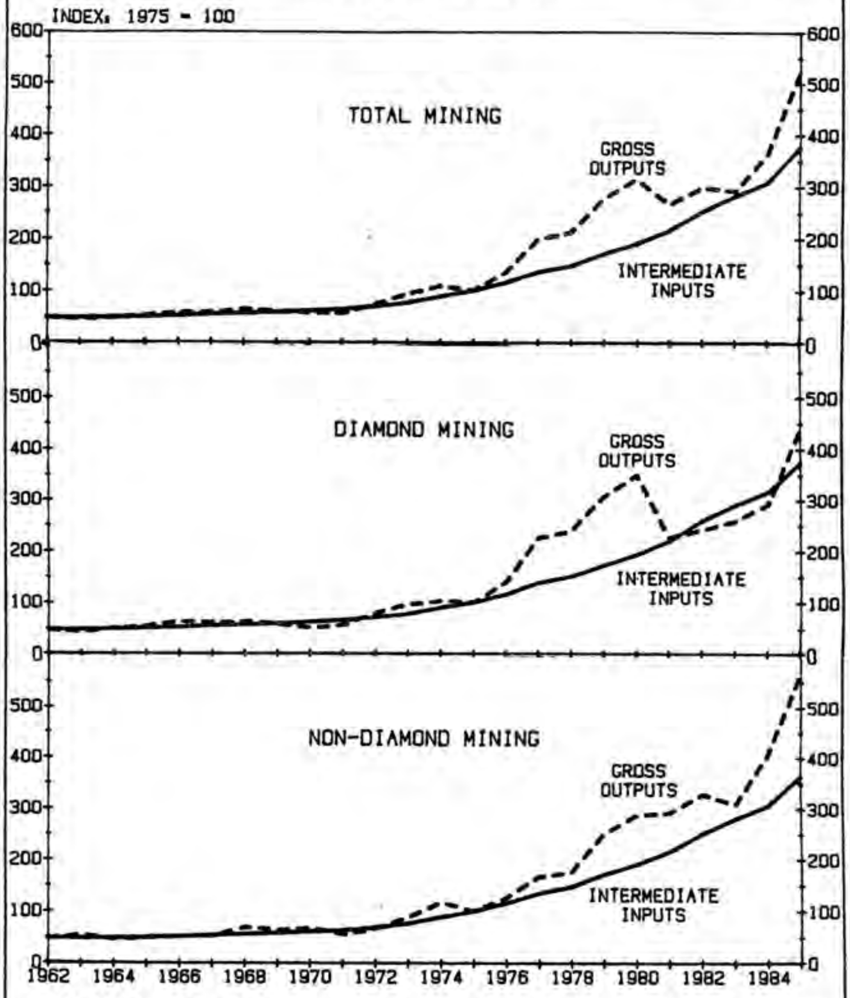
The decreasing productivity ratio in mining is a reflection of the predicament currently facing the mining industry, and has serious consequences for the future of the economy, in that it restrains the income generating characteristics of the industry. With a diminishing productivity ratio, the future of the mining industry is becoming vague and insecure and if the mineral reserves are not expanded and the ore grade improved, the industry's capacity to generate income will deteriorate even further.

7.4.3 GROWTH IN UNIT VALUES OF INPUTS AND OUTPUTS

The third application of the analysis of price movements in mining is the comparison which may be made between input and output price movements to establish whether the mining industry has obtained faster increases in output prices than in input prices. It has already been established that if mineral output prices increase faster than input prices, it pays to be in mining, but if output prices increase slower than input prices or even decrease, the situation cannot be tolerated in the long run. This situation has prevailed for some time during the present recession, which commenced after 1981 forcing certain mines to cease their production.

Figure 7.4 depicts the progress of price indices of intermediate inputs and of gross outputs between 1962 and 1985. In general, the price trend of intermediate inputs represents a perfect exponential curve, whereas that of gross outputs did not show the same smooth exponential tendency, but was subject to considerable fluctuations, particularly during the early 'eighties. For total mining, output prices increased at a faster rate than prices of intermediate inputs for the best part of the period under discussion. After 1970 output prices began to increase faster than input prices until the 1974/75 recession. After that, output prices again soared rapidly - much faster than input prices. Since 1980, however, output prices began to decline to the prevailing level of input prices. Figure 7.4 also illustrates the price movements of diamond and non-diamond mining separately. The upsurge of output prices since 1975 has been much more notable in diamond mining than in the other mining industries. However, the sudden fall in the prices of diamonds during 1981 was just as drastic as the previous rise in diamond prices. Non-diamond mining did not experience similar sharp output price decreases than did diamond mining during 1981. Their output prices remained well above the input price level, but began levelling off until 1983. The soaring output prices in both mining industries since 1984 and especially during 1985 is not a true reflection of output price movements, but was brought about rather artificially by the declining external value of the rand. This, however, had the effect that output prices again stood well above the input price level during 1985.

FIGURE 7.4 - PRICE INDICES OF INTERMEDIATE INPUTS AND GROSS OUTPUTS



SOURCE: TABLE A.45

Given these price differentials between inputs and outputs, it is now possible to ascertain changes in the unit values of inputs and outputs in mining. Having established that real productivity in mining is showing a gradual declining trend, the question may well be asked how the mining industry can still remain financially strong. The answer lies in the price differential between mining's inputs and outputs, a point that was already raised in previous sections. If output prices rise faster or remain higher than input prices, it can make up for the deteriorating productivity and the final result in nominal and real terms would be that the position of the owners of factors of production, particularly the entrepreneur, can be maintained, if not improved. To determine whether this was in fact the situation in SWA/Namibia, it is necessary to compare the growth in unit values of inputs with that of outputs. Table 7.4 summarises the average annual percentage growth in the unit value of gross outputs and the different inputs for the period 1962 to 1985.

Table 7.4 shows that for all mining industries the average annual growth in unit values of outputs exceeded those of intermediate

TABLE 7.4 - AVERAGE PERCENTAGE INCREASE IN UNIT VALUES - 1962 TO 1985 -

MINING INDUSTRY	GROSS OUTPUT	INTER-MEDI-ATE INPUTS	VALUE ADDED		
			TOTAL	LABOUR	OPERA-TING SURPLUS
DIAMOND	12.4	9.6	13.7	12.1	15.6
NON-DIAMOND	12.8	9.6	16.8	13.9	34.5
TOTAL	12.4	9.6	14.9	13.1	18.6

SOURCE OF BASIC DATA: Table A.45.

inputs, thus resulting in an even faster average growth in the unit values of value added. For both diamond and non-diamond mining, unit values of intermediate inputs increased at an average annual rate of 9,6 per cent, whereas those of gross outputs for the respective mining sectors showed increases of 12,4 and 12,8 per cent per annum. This had the result that unit values of value added increased at an average annual rate of 13,7 per cent for diamond mining and 16,8 per cent for non-diamond mining. The fact that uranium prices showed rather dramatic increases during the latter part of the period under discussion, contributed to the high growth in unit values of non-diamond mining. Dividing the value added (or primary inputs) into its usual components, viz. remuneration of employees and operating surplus, it is evidenced that the non-labour inputs benefited much more from the increased output prices than did the labour inputs in mining. For diamond mining the unit values of labour and non-labour inputs increased at an average rate of 12,1 and 15,6 per cent respectively, whereas the average annual increases in unit values of the respective inputs in non-diamond mining amounted to 13,9 and 34,5 per cent. All increases in unit values of inputs in mining were well above the average increase in consumer prices (CPI) of 8,2 per cent per annum over the same period. Only unit values of labour inputs in diamond mining with an average growth of 12,1 per cent per annum did not benefit as much from the average increase in diamond output prices of 12,4 per cent per annum.

It may thus be concluded that the owners of factors of production in the mining industry have in general benefited considerably from growing output prices and have therefore improved their position in terms of the rise of the average price level, notwithstanding the declining productivity ratio. However, the instability of output prices against the continued rising input prices, again reflect the vulnerability of the local mining industry.

7.4.4 REAL VALUE ADDED IN MINING

Another important purpose of the price and cost analysis is to determine the real value added in mining, in the light of the above discussion of the movements of the unit value of inputs and the changing productivity in mining. The real value added in mining using four different deflating techniques has already been presented in chapter three. The concern here lies mainly with two of the deflating techniques. The first is the method extrapolating the value added in the base year with indices of physical volume of production and thus assuming that the productivity ratio, i.e. the ratio of intermediate input to gross output, in the base year remains unchanged before and after the base year. This method is also used for the official value added estimates. The second technique, appropriately called the "double deflation" technique, deflates gross outputs with the output price index and intermediate inputs by an appropriate price deflator and obtains the real value added as a residual item and thereby accounts for possible productivity changes, i.e. changes in the ratio of inputs to outputs.

It was pointed out in chapter three that if the productivity ratio in any particular year should rise above that of the base year, the first method tends to underestimate the real value added, and conversely over-estimates the real value added if the productivity ratio should lie below that of the base year. Because the input : output ratio generally shows a declining trend over the period 1962 to 1985, as was ascertained in section 7.4.2 above, it follows that prior to 1975 the real value added using method one was on average lower than that using the double deflation method and higher during the period after 1975. The aim of this exercise was to illustrate that the different methods of deflating value added can yield different results, depending on the likelihood of changes in the ratio between inputs and outputs and on the assumption made about these changes.

7.5 CONCLUSION

This chapter dealt with different aspect of cost and prices in mining. The main conclusion that was reached was that mining managed relatively well amidst declining production levels, principally owing to the fact that mining's output prices remained on average well above price levels in the rest of the economy, above import price levels and above prices of intermediate inputs into mining. This situation has a direct effect on the domestic price level only in as far as mining is responsible for maintaining higher wages than in the rest of the economy.

With relatively high mineral export prices and the pre-eminence of mineral exports in total exports, it is not surprising that mining has contributed a great deal to the favourable terms of trade of SWA/ Namibia. This is illustrated by the terms of trade for 1985:

Terms of trade for all exports	:	124.1
Terms of trade for non-mineral exports	:	73.5
Terms of trade for mineral exports	:	149.2

Mining's terms of trade is therefore continually compensating for the unfavourable terms of trade of the non-mineral exports.

Having established price movements of inputs and outputs in mining, it was possible to derive real inputs and outputs, which in turn could be used to determine real productivity ratios in mining. This exercise showed that there was a steady deterioration in the productivity in mining. This inopportune phenomenon was ascribed to the high fixed cost, the dwindling ore grades and the increased capital intensity.

It was also deduced that the owners of factors of production, viz. labour and more particularly the entrepreneur, have benefited considerably from the fact that output prices rose faster than intermediate input prices. This is so, because the remuneration of the factors of production is represented by the balance between the fast inflating output and the slower inflating intermediate input. Yet, this situation is not very stable over time. Output prices tend to be rather insecure, whereas input prices rise more smoothly and have at times exceeded the growth in output prices. For this reason the remuneration of the entrepreneur is largely dependent on output price movements relative to input price movements.

In conclusion one can say that the future of the mining industry is far from settled; the fact that output prices are still above input prices is the only factor keeping the mining industry economically viable. With output prices being artificially aided by the present adverse exchange rate situation, with input prices growing at an increasing rate owing to the high domestic inflation and the lower exchange rate and with productivity ratios falling, the medium-term future of mining in SWA/Namibia is indeed in the balance. Of course, there are many extraneous factors that brought about this situation, like the input and output prices, the exchange rate and markets, but the declining output level is something that needs urgent attention of all parties involved to somehow prevent a major collapse of the mining industry of SWA/Namibia.

CHAPTER EIGHT

THE DISTRIBUTION OF THE OPERATING SURPLUS

The analysis of the mining industry now reaches the point where the focus moves from the real inputs and outputs to money flows. It was established in section 3.2.2 that the value added in mining is divided into remuneration of employees and gross operating surplus. The former concept has been dealt with in chapter six. In this chapter attention is focused on the operating surplus and its distribution by examining the income and expenditure account of mining. An introduction to this account was given in table 1.3 in chapter one. The operating surplus, as was pointed out in section 3.2.2, is a blanket concept which represents the remuneration of all non-labour factors of production, i.e. capital, land (including the mineral rent) and entrepreneurship.

The concept "operating surplus" in national accounting, gives a rough indication of the "net profit or income" used in conventional accounting. People using the operating surplus as a yardstick for the performance of the mining industry, usually ignore the previous stages in the determination of the operating surplus, viz. investment, employment and production and the role prices and costs play in this process. In this chapter the emphasis will fall on the distribution of the operating surplus. This boils down to the question "who receives what from the value of mineral production" after provision has been made for all production costs (intermediate inputs and labour charges) and after the creation of a reserve (through the provision for depreciation) to replace existing capital stock. Apart from the analysis of the distribution of the operating surplus, this chapter also examines the distribution of the aggregate income of mining among all participants in the production process and all recipients of mining income.

8.1 THE ACCOUNTING FRAMEWORK

Table 8.1 shows the income and expenditure of diamond mining and non-diamond mining for 1984. At this stage only the accounts of incorporated mining enterprises are analysed, because the operating surplus of non-incorporated mining enterprises is transferred directly to the personal income and expenditure account of the household sector. It was established in chapter three, however, that the operating surplus of non-incorporated mining enterprises represents only a small fraction (less than 0,1 per cent) of total operating surpluses in mining.

The sources of income in these accounts are the net operating

TABLE 8.1 - THE INCOME AND EXPENDITURE ACCOUNTS OF MINING COMPANIES, 1984 - R millions

A. TOTAL MINING			
Property income (paid):		Net operating surplus	278.7
Interest	18.2	Property income (received):	
Dividends	100.6	Interest	23.4
Rent and royalties .	6.8	Dividends	2.7
Direct taxes	106.7	Rent and royalties .	3.7
Other current transfers	2.1		
Corporate saving	74.1		
DISBURSEMENTS	308.5	INCOME	308.5
B. DIAMOND MINING			
Property income (paid):		Net operating surplus	80.5
Interest	0.2	Property income (received):	
Dividends	31.5	Interest	6.1
Rent and royalties .	4.2	Dividends	-
Direct taxes	36.4	Rent and royalties .	0.8
Other current transfers	0.9		
Corporate saving	14.2		
DISBURSEMENTS	87.4	INCOME	87.4
C. NON-DIAMOND MINING			
Property income (paid):		Net operating surplus	198.2
Interest	18.0	Property income (received):	
Dividends	69.1	Interest	17.3
Rent and royalties .	2.6	Dividends	2.7
Direct taxes	70.3	Rent and royalties .	2.9
Other current transfers	1.2		
Corporate saving	59.9		
DISBURSEMENTS	221.1	INCOME	221.1

SOURCE: Table A.46.

surpluses derived from mining activities (carried forward from the production accounts, described in chapter three) and other income not derived directly from mineral production. The latter source of income is income from property and refers to receipts like dividends, interest, rent (from land only) and royalties. The net operating surplus, however, is by far the most important type of income for mining companies.

The total net income is now distributed among six different destinations. The first takes the form of dividend payments to the shareholders or owners of the mining enterprises, secondly, payments in the form of interest are made to creditors. Thirdly, for the right to use land or mining rights from property owning enterprises, mining companies make payments in the form of rent and royalties. (Although the government in SWA/Namibia holds all mining rights in the country, it receives no royalties or mining leases). The fourth recipient of mining's current income is the government who assesses direct taxes on the taxable earnings of mining companies. (It will be recalled that indirect taxes represent a claim against gross output of the mining industry and were dealt with in chapter three). Fifthly, mining companies also make transfers to the household sector by means of grants and donations (including donations to non-profit seeking institutions, like educational organisations) and to the foreign sector in the form of occasional tax payments to foreign governments and through transfers to foreigners. The final destination of mining companies' current income is the retained income or corporate saving. This amount in turn is available to finance fixed investment or other capital expenditures.

8.2 THE SIZE AND COMPOSITION OF THE INCOME OF MINING COMPANIES

Table 8.2 shows that until 1980 diamond mining had by far the larger share in the operating surplus of the mining sector, but that the operating surplus of other mining companies has grown proportionally larger since 1981 owing mainly to the growing importance in production and profits of uranium mining in SWA/Namibia.

TABLE 8.2 - THE NET OPERATING SURPLUS IN MINING

YEAR	DIAMOND MINING R'm	NON-DIAMOND MINING R'm	TOTAL MINING R'm	TOTAL MINING AS % OF TOTAL NET INCOME OF MINING	TOTAL MINING AS % OF TOTAL OPERATING SURPLUS IN ECONOMY
1970	38.9	33.0	71.9	81.9%	50.5%
1971	35.5	13.9	49.4	74.5%	39.5%
1972	68.4	11.0	79.4	75.5%	45.4%
1973	123.6	24.0	147.6	82.6%	55.0%
1974	81.2	34.1	115.3	79.5%	44.4%
1975	94.0	14.9	108.9	89.9%	37.5%
1976	114.3	6.0	120.3	94.9%	35.3%
1977	232.5	33.1	265.6	96.9%	56.3%
1978	339.4	60.9	400.3	97.1%	66.2%
1979	284.9	147.6	432.5	97.4%	64.5%
1980	295.9	161.2	457.1	97.7%	65.0%
1981	109.9	143.7	253.6	94.5%	46.2%
1982	74.8	182.6	257.4	95.0%	43.1%
1983	101.1	140.8	241.9	93.3%	42.6%
1984	80.5	198.2	278.7	90.3%	43.5%
1985	247.1	403.6	650.7	92.4%	60.5%

SOURCE: Table A.46; Department of Finance (1986a: 19).

The operating surplus is by far the most important type of income for mining companies, judging from its percentage contribution to total current income of mining companies. This share ranged from a low of 75 per cent in the early 'seventies to more than 90 per cent in the late 'seventies and early 'eighties. This means that income from property (dividends, interest, rent and royalty receipts) by mining companies has become a minor source of income of mining companies. During the early 'seventies, however, local diamond mining companies were large investors in the South African diamond mining industry and earned the local industry healthy dividends. This policy of mutual shareholding between local and South African mining companies has changed since 1975 and the policy was adopted whereby all companies associated with the local diamond mining industry were changed from public to privately owned companies. Furthermore, it seems that because local mining companies are to a large extent foreign owned, the policy has been adopted of distributing the majority share of mining company income to shareholders, leaving less surplus funds for investment in other local or foreign industries. For this reason the income from property received by mining companies has become such a minor contributor to their total current income. During 1978 it amounted to less than 3 per cent of mining companies' current income as compared to the 11 per cent in the case of South African mining companies (Lombard & Stadler, 1980: 45).

The net operating surplus of mining companies is by far the largest single contributor to the net operating surplus of the economy as a whole. This contribution ranged between 40 and 66 per cent. The decline during the period 1975/1976 may be ascribed to the 14,3 per cent drop in the output prices of non-diamond mining during 1975 (see table A.38), whereas the lower contribution of mining companies to the total net operating surplus between 1981 and 1984, resulted mainly from the decline in diamond production and the sharp drop in diamond prices during 1981.

8.3 THE DISTRIBUTION OF NET INCOME OF MINING COMPANIES

The net income of mining companies is distributed in three main directions, namely (a) dividends paid to shareholders, (b) direct taxes paid to the government and (c) saving which is income retained by mining companies. Other payments include property income paid, such as interest, rent and royalties, and transfers to households and to the rest of the world, but these payments only represent a minor portion of the total disbursements.

Table 8.3 gives details of the percentage distribution of net mining company income for the years 1970 to 1985. It shows that dividend payments, direct tax payments and savings were the largest claimants on mining companies' profits. As a percentage of the net income of all mining companies, dividend payments ranged between 21 and 57 per cent, direct tax payments ranged between 9 and 51 per cent and saving

TABLE 8.3 - PERCENTAGE DISTRIBUTION OF NET MINING COMPANY INCOME

YEAR	INTE-REST	DIVI-DENDS	ROYAL-TIES	DIRECT TAXES	TRANS-FERS	SAVING	TOTAL INCOME
1970	1.4	37.5	3.4	41.1	0.2	16.4	100.0
1971	1.1	56.7	4.5	51.1	0.3	-13.7	100.0
1972	0.7	30.4	2.9	17.5	0.2	48.4	100.0
1973	0.8	21.4	1.6	20.9	0.1	55.1	100.0
1974	1.7	33.5	2.1	47.4	0.2	15.1	100.0
1975	3.5	29.0	2.6	32.9	0.2	31.7	100.0
1976	10.9	48.6	3.3	25.0	0.8	11.4	100.0
1977	7.4	30.5	1.8	14.6	0.6	45.1	100.0
1978	7.5	31.9	1.4	30.9	0.5	27.7	100.0
1979	5.5	31.5	1.3	33.8	0.4	27.6	100.0
1980	3.0	26.8	1.6	25.5	0.4	42.6	100.0
1981	4.7	31.8	3.2	22.4	0.9	37.0	100.0
1982	6.1	34.9	2.7	10.0	3.7	42.6	100.0
1983	5.8	21.8	2.7	9.1	0.8	59.7	100.0
1984	5.9	32.6	2.2	34.6	0.7	24.0	100.0
1985	2.7	42.8	1.4	17.2	1.0	35.0	100.0

SOURCE: Table A.46.

ranged between a dissaving of 14 per cent and a saving of 60 per cent.

Table 8.4 illustrates the distribution of mining's net income for two eight-year periods, viz. 1970 to 1977 and 1978 to 1985. During the first period diamond mining companies' dividend payments in absolute terms were about four times as large as those of non-diamond mining companies. In the second eight-year period dividends paid by non-diamond mining exceeded those of diamond mining by 13 per cent. This clearly illustrates the fast financial progress made by the non-diamond mining industry. The uranium mining industry has obviously contributed significantly to this progress. In both periods both industries distributed on average more than 30 per cent of their total net income to shareholders, but, as was shown in table 8.3 above, this ratio varied considerably, namely between a low of 21 per cent and a high of 57 per cent.

In non-diamond mining the undistributed income (corporate saving) as percentage of its net income, increased from 9 to 40 per cent from the first to the second period, implying that internal sources are increasingly appropriated for financing capital expenditure. This is also evidenced by the fact that interest payments in non-diamond mining as percentage of net income decreased from 25 to 5 per cent during the two periods under discussion. Interest payments of diamond mining companies are negligible, since these companies are almost self-financing in current and capital expenditure. The significance of mining's saving and the financing of capital expenditure will be the theme of the discussion in the next chapter.

TABLE 8.4 - SUMMARY OF THE DISTRIBUTION OF NET MINING INCOME

PERIOD	INTE-REST	DIVI-DENDS	ROYAL-TIES	DIRECT TAXES	TRANS-FERS	SAVING	TOTAL
	A. TOTAL MINING - R millions						
1970-'77	44.8	369.8	27.1	306.1	4.0	353.0	1104.8
1978-'85	150.4	1035.3	58.7	736.1	29.4	1126.2	3136.1
1970-'85	195.2	1405.1	85.8	1042.2	33.4	1479.2	4240.9
	B. DIAMOND MINING - R millions						
1970-'77	0.0	297.1	20.8	264.9	2.7	336.9	922.4
1978-'85	2.0	486.2	34.3	556.5	13.0	504.6	1596.6
1970-'85	2.0	783.3	55.1	821.4	15.7	841.5	2519.0
	C. NON-DIAMOND MINING - R millions						
1970-'77	44.8	72.7	6.3	41.2	1.3	16.1	182.4
1978-'85	148.4	549.1	24.4	179.6	16.4	621.6	1539.5
1970-'85	193.2	621.8	30.7	220.8	17.7	637.7	1721.9
	A. TOTAL MINING - Percentages						
1970-'77	4.1	33.5	2.5	27.7	0.4	32.0	100.0
1978-'85	4.8	33.0	1.9	23.5	0.9	35.9	100.0
1970-'85	4.6	33.1	2.0	24.6	0.8	34.9	100.0
	B. DIAMOND MINING - Percentages						
1970-'77	0.0	32.2	2.3	28.7	0.3	36.5	100.0
1978-'85	0.1	30.5	2.1	34.9	0.8	31.6	100.0
1970-'85	0.1	31.1	2.2	32.6	0.6	33.4	100.0
	C. NON-DIAMOND MINING - Percentages						
1970-'77	24.6	39.9	3.5	22.6	0.7	8.8	100.0
1978-'85	9.6	35.7	1.6	11.7	1.1	40.4	100.0
1970-'85	11.2	36.1	1.8	12.8	1.0	37.0	100.0

SOURCE: TABLE A.46.

Diamond mining companies' direct tax payments were much larger in absolute terms and as percentage of their net income than those of non-diamond mining companies. Diamond mining companies paid on average 33 per cent of their net income in direct taxes, whereas this average for non-diamond mining companies amounted to 13 per cent. Mining companies' tax payments will be discussed again in chapter eleven, which deals exclusively with this and related subjects.

Comparing the average distribution of net mining income in SWA/Namibia with that in South Africa (cf. Lombard & Stadler, 1980: 94) for the period 1970 to 1978, the following differences emerge: In both cases dividends are the largest claimants of net income: 33,0 and 34,5 per cent for SWA/Namibia and South Africa, respectively. Direct tax payments claim 28,6 and 26,5 per cent in the respective countries, whereas savings amount to 30,8 per cent of net income in SWA/Namibia and to 22,1 per cent in South Africa. It thus appears that the profitability of mining in SWA/Namibia is similar to that of the mining industry in South Africa. A slightly higher tax claim applies to SWA/Namibia, primarily owing to the pre-eminence of the higher tax payments by diamond mines in the local mining sector. The savings ratio, on the other hand, is much higher in SWA/Namibia than in South Africa. This supports the view expressed earlier, that the mining industry in SWA/ Namibia draws most of its financing requirements from internal sources. Mining companies in South Africa on the other hand, are geared considerably on external sources of finance, presumably due to the established capital and money markets prevalent in that country.

8.4 THE DISTRIBUTION OF TOTAL GROSS INCOME OF THE MINING INDUSTRY

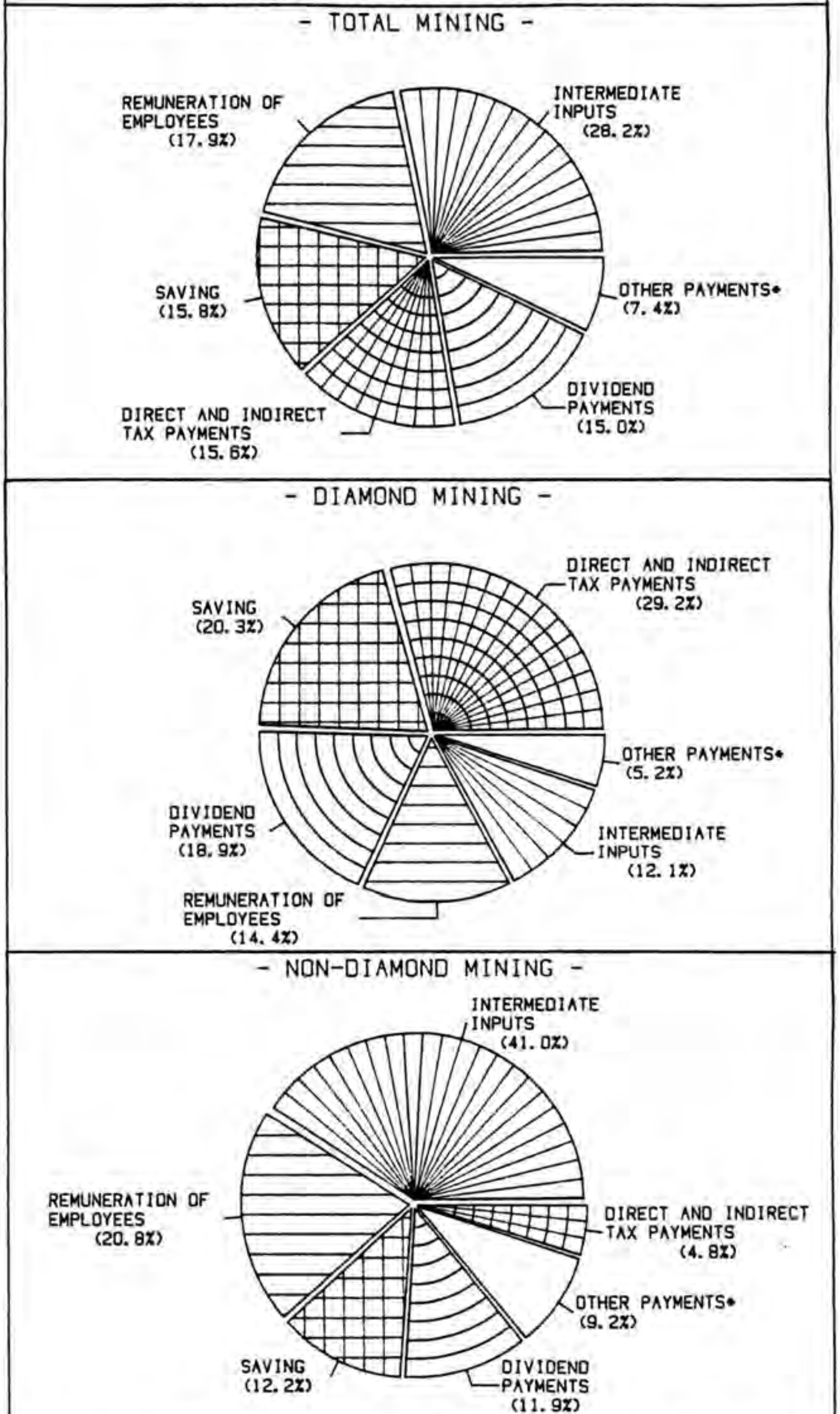
In the previous section attention was focused on the distribution of the net income of mining companies. This section will present a consolidated view of the distribution of all sources of income, i.e. gross outputs and income from property. In effect this is a combination of account no. 1 (discussed in chapter three) and account no. 2 (discussed above).

The consolidated accounts for the mining industry for the period 1970 to 1985 appear in table A.47, and figure 8.1 depicts the distribution of the total income of diamond, non-diamond and total mining. From figure 8.1 it appears that for diamond mining, tax payments (direct and indirect) constitute the single largest expenditure item, viz. 29 per cent of total current income, followed by retained profits (20 per cent), dividend payments (19 per cent) and remuneration of employees (14 per cent). The fact that intermediate inputs constitute only a relatively small expenditure item, (i.e. 12 per cent of total current income) illustrates the profitability of diamond mining in SWA/Namibia.

The distribution of current income of the non-diamond mining industry differs widely from that of the diamond mining industry. Intermediate inputs make up the largest single expenditure item, accounting for about 41 per cent of total current expenditure (= current income), followed by remuneration of employees (21 per cent), corporate saving (12 per cent) and dividend payments (12 per cent). Tax payments, however, constitute only about 5 per cent of total current expenditure.

In both mining industries the share of corporate saving in total current income is quite high, owing to the fact that the mining industry directs most of its retained profits to finance its own capital expenditure, as will be seen in the next chapter which deals with the subject of financing capital formation.

FIGURE 8.1 - DISTRIBUTION OF TOTAL GROSS INCOME IN MINING - TOTAL FOR 1970 TO 1985



* PROVISION FOR DEPRECIATION, RENT, ROYALTY AND INTEREST PAYMENTS AND CURRENT TRANSFERS

SOURCE: TABLE A.47

8.5 CONCLUSION

This chapter investigated the net income of mining and how it is distributed among different economic participants. It was first established that the net operating surplus in mining contributes between 35 and 66 per cent to the total net operating surplus of the economy as a whole. This widely varying contribution depends mainly on the operating results of mining and is the principal reason for the cyclic feature of the mining industry and of the economy as a whole. It was also established that the net operating surplus in mining is the prime source of mining's income and contributed between 75 and 98 per cent of the net mining income. The other sources of income, mainly interest and dividend receipts, were small especially during the latter part of the period examined. This proves that very little of surplus funds generated by mining is invested elsewhere in the economy, which might have earned the industry additional non-operating income. This tendency may be ascribed to the fact that a large portion of mining's income is distributed to shareholders or retained for financing of capital investment.

Having examined the distribution of net mining income, it was concluded that over the period 1970 to 1985 the bulk of net income (35 per cent) was retained as a reserve to finance capital investment. 33 per cent was distributed to shareholders, whereas 25 per cent was paid to the government in the form of direct taxes. Interest payments constituted only 5 per cent, implying that mining is not a large borrower of funds, but draws most of its capital needs from internal sources.

For further clarity on this subject, the distribution of total income was also analysed. This exercise showed up different distribution patterns for the different mining industries. It was indicated that while tax payments represent the largest expenditure item for diamond mining, intermediate inputs draw the largest portion of non-diamond mining's income.

Having established the sources and appropriation of mining's net income in this chapter, it is necessary to further investigate two items of the distribution of net income. These are savings and taxation. Saving was defined as the balancing item between current income and expenditure. The saving in mining and the way in which it is used to finance investment in mining is the theme of the next chapter. Mining's tax payments are examined in chapter eleven together with other related issues.

CHAPTER NINE

THE FINANCING OF CAPITAL FORMATION

The three accounts of the accounting framework, viz. the production account, the income and expenditure account and the capital formation and finance account were introduced in chapter one. Having dealt with the first two accounts in chapters three and eight respectively, this chapter focuses on the latter account. It links up the discussion of capital formation in chapter four with that of corporate saving in the previous chapter. The capital formation and finance account thus indicates the extent to which mining companies are able to finance their capital formation (or investment) by funds generated from own production activities, in the form of corporate saving retained from current income and from reserves provided for capital replacement by means of a provision for depreciation.

It should be mentioned, however, that corporate saving should not be seen as an amount of cash, but rather as a type of financial claim. The holder of these claims may exercise options to reinvest in the industry concerned or to invest in the other sectors of the economy or conversely to attract additional funds from other domestic or foreign sources for investment in the mining industry.

From the point of view of the national accounts, total saving in a country is "pooled" to finance its investment. The surplus or deficit arising from such transactions represents the surplus or deficit on the current account of the balance of payments. As was mentioned in chapter one, no data on the sources of external finance of mining are available and it is therefore not possible to distinguish between domestic and foreign financing of capital investment in the mining sector. It is, however, a well known fact that most of the loan and share capital in mining companies is foreign owned. The question of foreign ownership in mining will be dealt with in the next chapter.

9.1 MINING'S CAPITAL FORMATION AND FINANCE ACCOUNT

Table 9.1 gives details of the capital formation and finance accounts for diamond, non-diamond and total mining for 1984. It may be seen that the internal sources for financing capital formation are corporate saving transferred from account no. 2 (discussed in chapter eight) and provision for depreciation transferred from the production account, which was discussed in chapter three. It was pointed out in section 3.2.2 that provision was made for capital replacement of the existing capital stock, representing the difference between the gross and the net operating surplus. Provision for depreciation is a kind of reserve created for replacing capital and is therefore transferred

TABLE 9.1 - MINING'S CAPITAL FORMATION AND FINANCE ACCOUNTS, 1984 - R millions

A. TOTAL MINING			
Gross fixed capital formation	31.9	Corporate saving ..	74.1
Change in inventories	19.1	Provision for depreciation	43.6
		Net lending (-)/net borrowing (+) ...	-66.7
GROSS INVESTMENT ..	51.0	FINANCING OF GROSS INVESTMENT	51.0
B. DIAMOND MINING			
Gross fixed capital formation	6.9	Corporate saving ..	14.2
Change in inventories	1.9	Provision for depreciation	15.3
		Net lending (-)/net borrowing (+) ...	-20.7
GROSS INVESTMENT ..	8.8	FINANCING OF GROSS INVESTMENT	8.8
C. NON-DIAMOND MINING			
Gross fixed capital formation	25.0	Corporate saving ..	59.9
Change in inventories	17.2	Provision for depreciation	28.3
		Net lending (-)/net borrowing (+) ...	-46.0
GROSS INVESTMENT ..	42.2	FINANCING OF GROSS INVESTMENT	42.2

SOURCE: Table A.48.

to the capital formation and finance account. It should be pointed out, however, that the item "provision for depreciation" is not the sum of the actual provisions made by the different mining companies in SWA/Namibia, but is an imputed value using the straight line method of capital replacement based on the estimated life of the particular type of asset acquired by the mining sector as a whole during a certain year.

From table 9.1 it appears that during 1984 both the diamond and the non-diamond mining industry were in an extremely good financial position notwithstanding the poor operating results during the same year. The internal sources of finance in diamond mining, amounting to R29,5 million were more than sufficient to finance its own investment of R8,8 million. Surplus savings of R20,7 million had thus become available, which put the industry in a good position of net lender of funds to the rest of the economy.

A similar situation is found with the rest of the mining industry, with the difference that this industry's capital formation was much higher than that of the diamond mining industry. It was also able to finance its own capital formation and, owing to the good financial results and the low investment during 1984, it was placed in a position where R46 million was left unappropriated and was thus available for other capital transactions.

9.2 SAVING IN THE MINING INDUSTRY

Both sources of saving in the mining industry have already been described in the previous section.

In this section the magnitude of these savings is evaluated against the background of the saving in the total economy. Table 9.2 gives details of this analysis, from which it appears that during the early 'seventies mining's savings were rather unstable and inconsistent.

TABLE 9.2 - GROSS SAVING OF MINING AND THE REST OF THE ECONOMY

YEAR	R millions: MINING: DIAMOND MINING	MINING: NON-DIAMOND MINING	MINING: TOTAL MINING	NON-MINING: PRIVATE SECTOR	NON-MINING: GOVERNMENT SECTOR	TOTAL GROSS DOMESTIC SAVING	SAVING OF MINING AS PERCENTAGE OF: TOTAL PRIVATE SAVING	TOTAL DOMESTIC SAVING
1970	13.3	6.3	19.6	67.6	41.6	128.8	22.5	15.2
1971	0.2	-3.9	-3.7	63.9	43.7	103.9	-6.1	-3.6
1972	50.6	6.1	56.7	81.8	21.8	160.3	40.9	35.4
1973	88.3	16.9	105.2	94.0	48.2	247.4	52.8	42.5
1974	17.8	13.4	31.2	96.1	72.7	200.0	24.5	15.6
1975	43.0	7.9	50.9	111.0	63.9	225.8	31.4	22.5
1976	32.4	-0.6	31.8	135.0	82.3	249.1	19.1	12.8
1977	123.9	21.6	145.5	100.9	110.2	356.6	59.1	40.8
1978	108.0	31.7	139.7	129.2	231.3	500.2	52.0	27.9
1979	38.7	113.0	151.7	151.5	184.2	487.4	50.0	31.1
1980	122.8	109.0	231.8	105.1	130.9	467.8	68.8	49.6
1981	40.6	96.4	137.0	186.6	77.9	401.5	42.3	34.1
1982	45.2	110.8	156.0	146.6	130.9	433.5	51.6	36.0
1983	63.9	133.2	197.1	177.0	82.7	456.8	52.7	43.1
1984	29.5	88.2	117.7	171.0	198.8	487.5	40.8	24.1
1985	165.7	125.5	291.2	159.7	264.3	715.2	64.6	40.7

SOURCE: Table A.48 and Department of Finance (1986a: 22-23).

Since 1977, however, these savings became more stable and grew into relatively large amounts, contributing on average more than 50 per cent to the total saving of the private sector and more than a third to the total gross domestic saving of the country. What is striking though is the fact that over the same period mining contributed more to the private sector's saving than to its output. This clearly indicates that mining is not only an important generator of income, but also generates significant amounts of surplus funds in the economy. How these amounts are put to productive use is set out in the next section.

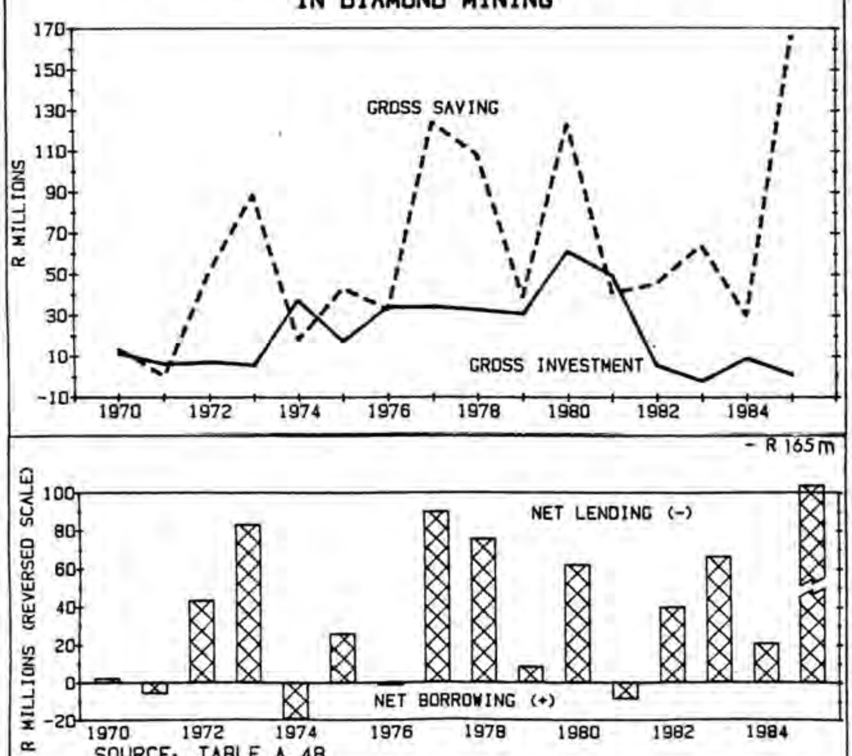
9.3 FINANCING OF INVESTMENT IN MINING

It was established in section 9.1 that the balance between gross investment and gross saving constitutes the mining industry's capacity for net lending to (or borrowing from) the other sectors of the economy through the money and capital markets. In this section attention will be given to investment and saving in mining and particularly to the balances between these aggregates. "Borrowing" in the national accounting context refers to obtaining both equity and non-equity sources of finance.

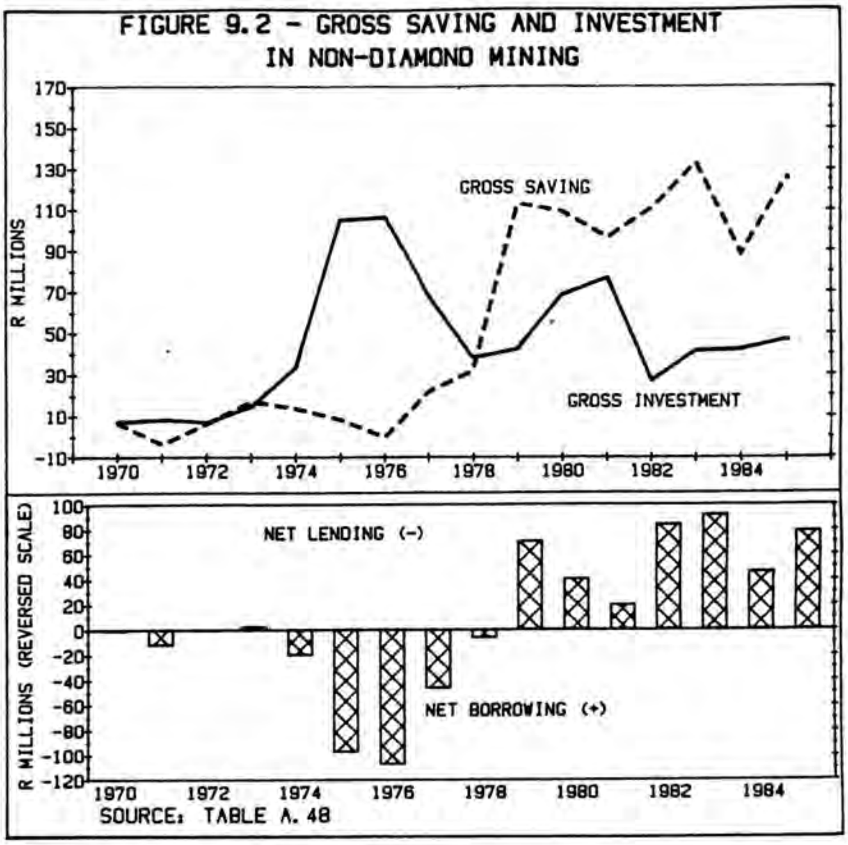
Figures 9.1 and 9.2 depict the gross investment and the gross saving of diamond and non-diamond mining in the upper graphs, and the net lending or borrowing resulting from discrepancies in gross investment and gross saving in the lower graph. (Note the inverted scale in the lower graph.)

From figure 9.1 it appears that gross saving in diamond mining was, with the exception of four years, always sufficient to cover its gross investment, enabling the diamond mining industry to become a large net lender to the rest of the economy. This situation was caused not only

FIGURE 9.1 - GROSS SAVING AND INVESTMENT IN DIAMOND MINING



SOURCE: TABLE A.48



by the above average profitability of diamond mining in SWA/Namibia, but also by the fact that diamond mining is less capital intensive than other industries.

The non-diamond mining industries depicted in figure 9.2, however, more often needed external funds (in the form of loan and share capital) from the rest of the economy or from foreign sources. This net borrowing position prevailed for the best part of the 'seventies during which the Rössing uranium mine was being developed and vast amounts of fixed capital were invested, requiring external sources of finance. Since 1978, however, these high development expenditures have started to decline, and the gross saving has begun to increase owing to the improved operating results of uranium and other mining. This trend caused the non-diamond mining industry also to become a substantial net lender to the rest of the economy.

The question of net lending or net borrowing in mining and how they fit in with the rest of the economy and with the balance on the current account of the balance of payments requires further explanation. Table 9.3 gives details of the gross investment and gross saving of total mining and the rest of the economy. The balance between these two aggregates for the total economy is by definition equal to the balance on the current account of the balance of payments. The balance on the current account in this context is analysed from a financial flow point of view rather than from the point of view of the real flow of goods and services. The latter concept will be analysed in the next chapter.

TABLE 9.3 - GROSS SAVING AND GROSS INVESTMENT - R millions

YEAR	GROSS SAVING			GROSS INVESTMENT			BALANCE		
	MINING	REST OF ECONOMY	TOTAL	MINING	REST OF ECONOMY	TOTAL	MINING	REST OF ECONOMY	TOTAL*
1970	19.6	109.2	128.8	18.2	83.4	101.6	1.4	25.8	27.2
1971	-3.7	107.6	103.9	14.1	118.2	132.3	-17.8	-10.6	-28.4
1972	56.7	103.6	160.3	13.7	102.1	115.8	43.0	1.5	44.5
1973	105.2	142.2	247.4	19.8	124.8	144.6	85.4	17.4	102.8
1974	31.2	168.8	200.0	70.4	194.4	264.8	-39.2	-25.6	-64.8
1975	50.9	174.9	225.8	122.2	229.8	352.0	-71.3	-54.9	-126.2
1976	31.8	217.3	249.1	140.2	258.7	398.9	-108.4	-41.4	-149.8
1977	145.5	211.1	356.6	101.9	252.8	354.7	43.6	-41.7	1.9
1978	139.7	360.5	500.2	70.3	227.6	297.9	69.4	132.9	202.3
1979	151.7	335.7	487.4	72.6	294.3	366.9	79.1	41.4	120.5
1980	231.8	236.0	467.8	129.6	373.7	503.3	102.2	-137.7	-35.5
1981	137.0	264.5	401.5	126.0	360.2	486.2	11.0	-95.7	-84.7
1982	156.0	277.5	433.5	32.1	376.0	408.1	123.9	-98.5	25.4
1983	197.1	259.7	456.8	39.2	286.4	325.6	157.9	-26.7	131.2
1984	117.7	369.8	487.5	51.0	297.0	348.0	66.7	72.8	139.5
1985	291.2	424.0	715.2	47.8	326.0	373.8	243.4	98.0	341.4
TOTAL	1859.4	3762.4	5621.8	1069.1	3905.4	4974.5	790.3	-143.0	647.3

* = Balance on current account of balance of payments.
SOURCE: Tables A.5, A.48 and Department of Finance (1986a: 23).

From table 9.3 the influence of mining on the balance of the current account becomes apparent. During the mid-'seventies for example, when mining was in a net borrowing position in relation to the rest of the economy, the balance on the current account reached its lowest balance yet and since the rest of the economy was largely not able to provide these occasional finance shortfalls in the mining industry, the mining industry had to rely on foreign sources of finance in the form of loan and share capital. However, in the subsequent period the good financial results of mining and the lower level of fixed investment in mining led to a sharp rise in surplus saving in mining, which is clearly reflected in the surplus on the current account of balance of payments, except for a few years when the net borrowing of the rest of the economy (mainly in the government sector) was too high to be covered by the net surpluses of the mining sector.

For the period 1970 to 1985 as a whole, mining showed an accumulated positive balance of R790,3 million between its gross saving and its gross investment, whereas the rest of the economy could not cover its gross investment by its internal sources of finance. In fact, the surplus funds generated by mining were more than sufficient to cover the shortfall of R143,0 million in the rest of the economy, while still leaving an accumulated surplus on the current account of the balance of payments of R647,3 million. It thus appears that through the generation of surplus funds in the economy, the mining industry has a significant influence on the balance of payments of the country.

9.4 FUTURE SOURCES FOR FINANCING MINING INVESTMENT

The question may rightfully be asked, whether mining's surplus savings are in actual fact appropriated to finance local non-mining investment via the local capital and money markets. Although it would appear so from the accumulated results presented in table 9.3, there are a few bottle necks which inhibit this natural flow of funds. The first problem lies in the virtual non-existence of an independent capital and money market in the country. Although there are many financial institutions in SWA/Namibia, they still operate either as branch offices or as subsidiaries of South African financial institutions through the South African capital and money market. The second problem arises from the fact that most multi-national mining companies conduct most of their bank business outside the country. This is evidenced by the fact that mining generated surplus savings of R243,4 million during 1985 (table 9.3), whereas the total deposits of all companies with local commercial and general banks grew by only R18,2 million during 1985 (Department of Finance, 1986a: 31). (The role of taxation in inducing this practice is discussed in section 11.2.1.)

The lack of local financial institutions is also an important reason why non-mining saving cannot be mobilised to finance developments in the mining sector, or *vice versa*. Although it was stated above that the non-mining sector was largely not able to meet mining's finance needs, it must be pointed out that this is mainly a macro-economic deduction based on the *net* borrowing position of the rest of the economy and does in fact refer mainly to financial shortfalls in the government sector. Suffice it to say here that if afforded the opportunity, the local non-mining industry is in a good financial position to acquire a substantial portion of shares in the mining industry still held by non-residents. In this respect, Bosson and Varon (1984: 187) foresee that more and more consumers will be willing to provide small amounts of equity finance, but then the mining industry must be willing to accept small shareholders and the necessary mechanisms to cater for small investors should be created. However, local ownership of mining interests should not be enforced on mining companies, but should rather be affected through a process of moral persuasion. It is not too far fetched to assume that once local interests are also represented in the mining industry, mining development and particularly linkages between mining and other domestic industries will be stepped up considerably.

Apart from a lack of financial institutions, the local financing of mining investment is further hampered by existing exchange control regulations, which restrict local borrowing if the equity in local mining companies is held by non-residents. This proviso was introduced to prevent excessive "gearing" with local funds (cf. de Kock-Commission, 1985: 135) and has thus discouraged the use of local non-equity finance, which has contributed to the present situation where many local mining companies have become foreign owned. Furthermore, the existing financial ties of multi-national mining companies with international investors and financial institutions and the fact that mining companies have built up appreciable reserves to finance their investments from internal funds, obstructs local investors of becoming shareholders in or lenders to local mining companies. In conclusion, it seems that the current problem does not so much involve a lack of local savings, but rather a lack of investment in mining related projects, which can be attributed to the fluid political climate in SWA/Namibia.

In the face of the problems experienced with the mobilisation of surplus capital in SWA/Namibia, it is necessary to consider a few possibilities for future financing of capital investment in mining. Proposals for the future financing of mining investment can be categorised into internal and external financing. There is still a "popular" belief that the lack of mining development in SWA/Namibia could be ascribed to a lack of local investment capital, but it was shown above that sufficient surplus funds are available in the economy to warrant considerable investment programmes. Moreover, international sources of finance are always available, provided that the investment opportunities are economically viable and a stable political climate prevails.

The first prerequisite for the <u>internal</u> financing of investment in mining is the development of certain financial institutions. At this stage it is not necessary (nor is it possible) to discontinue all ties with South African financial institutions in an attempt to establish a fully fledged money and capital market in SWA/Namibia. Certain financial institutions such as mining houses, discount houses, export finance institutions and even a stock exchange can, however, make a considerable contribution to encourage local ownership of equity in the mining industry and to mobilise large financial surpluses from domestic sources to finance mining investment through loans. Since medium and small-scale mining operations may encounter difficulties when trying to tap international sources, they can be financed only from within the country. For these mining operations it is advisable to mobilise surplus funds in the economy through a mining bank or a development bank which opens up a "mining window" to promote technically and financially viable mining and related projects. Commercial banks, too, may be prepared to channel capital funds into the small-scale mining sector, although they will not be able to provide the necessary technical assistance, which a mining or development bank can offer. Finally, seen that mining companies hold sizable amounts of unappropriated surplus savings at present, it could be necessary to introduce certain requirements for the reinvestment of retained mining profits in prospecting, exploration and mine development. During the period 1981 to 1985 mining companies in SWA/Namibia have spent R71,2 million on exploration (Chamber of Mines, 1986: 3-4), which does not compare very favourably with mining's surplus saving of more than R600 million over the same period (table 9.3), particularly if it is taken into account that exploration expenditures qualify for immediate write-off from taxable profits. If the country is to revive its investment climate in mining, it should be initiated primarily by the mining industry itself, which, as was established above, does have the financial resources at its disposal. If moral persuasion to this effect does not have the desired outcome, proper arrangements for the reinvestment of retained profits will have to be introduced. Directives for reinvestment should not only apply to mining development, but should also arrange for developments to provide linkages between mining and other tertiary and secondary industries.

The bulk of future financing requirements for mining investment is still expected to come from external sources. There are essentially three sources of external financing for Third-World mining investments: multi-national mining corporations, international development agencies and host government borrowing from private financial markets. The last two sources of financing mining investment are virtually non-existent in SWA/Namibia and most of financing still takes place through multi-national corporations operating in the mining industry. However, in many developing countries a decline in foreign private investment is experienced, partially due to the emergence of state owned mining enterprises. In addition to acquiring foreign owned mining properties, state mining enterprises expanded their investment with loans provided or guaranteed by their governments from private international lenders or from development institutions like the World Bank (Mikesell, 1985: 50-51).

Having established mechanisms to mobilise funds from internal and external sources to finance mining and related projects, it is also necessary to find ways to attract potential investors. It is important that the government should have at its disposal all the relevant information on the geology, mineral resources and potential mining and related projects in order to pass it on to potential investors in a professional way, for example by means of geological or investment conferences or through a minerals handbook. Potential investors should also have free access to all information regarding the infrastructure, environmental requirements, the possibility of joint ventures, the financing requirements, the availability of financial sources and the fiscal arrangements pertaining to SWA/Namibia.

9.5 CONCLUSION

This chapter dealt with the financing of capital investment in mining. Mining's internal sources of financing capital investment are first the corporate savings and second the provision for depreciation. During the early 'seventies these savings were small and inconsistent, but grew into substantial amounts after 1977 when they amounted on average about half of the total private savings and about a third of the total savings. Whereas diamond mining was able to finance the bulk of its investment from internal savings, the savings in non-diamond mining was more often insufficient to cover its investment. These occasional finance shortfalls were generally offset by foreign capital inflows, because the rest of the economy was mostly not in a position to furnish the bulk of these amounts, nor have the necessary financial structures been available to mobilise such amounts. For the period 1970 to 1985 as a whole, however, mining showed substantial surplus savings above its own investment, which contributed significantly towards the surpluses on the current account of the balance of payments particularly during the late 'seventies and early 'eighties.

In chapter five it was stated that the country is trapped in a vicious cycle of declining investment leading to declining output, which in turn discourages further investment. This chapter therefore made some suggestions to escape from this cycle. The conclusion was reached that a lack of funds to finance mining and related projects is not a large stumbling block in the way of future development. The principal problem lies in the fact that these surplus funds cannot be mobilised, due to an underdeveloped capital and money market and that the investment potential of mining is not proclaimed wide enough to attract potential investors.

It was suggested that internal financial sources should be mobilised through the creation of conventional financial institutions such as mining houses or through a development and mining bank. Mining companies accumulate substantial amounts of surplus savings, and since its reinvestment is limited, it was suggested that certain requirements should be introduced to compel mining companies to reinvest a certain portion of their retained profits in mining and mining related projects. External sources could be tapped through multi-national mining corporations, international development agencies or through government borrowing from private financial markets. The latter two sources are not used in SWA/Namibia, but should be considered seriously in future. In order to attract internal and external sources of finance, it is necessary that all the relevant information on the economic and geological environment should be well-publicised among potential investors through conferences or publications.

This chapter assessed mining's role in the balance of payments from a financial point of view by examining the balances between mining's savings and its investments. Mining's role in the balance of payments could also be analysed from the point of view of the flow of goods and services. This and other related issues is the subject of the next chapter.

CHAPTER TEN

MINING AND THE REST OF THE WORLD

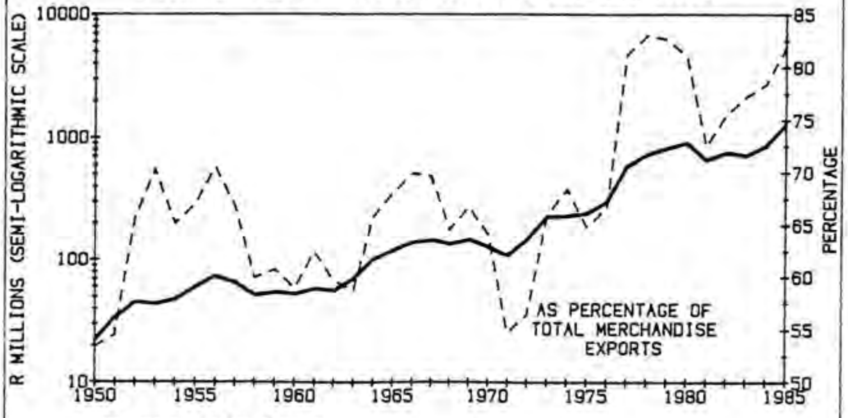
This chapter focuses on mining's relations with the rest of the world. Attention is given to the role of mineral exports in the balance of payments and the imports of goods and services resulting directly and indirectly from mineral production are also taken into account to get a complete picture of mining's net contribution to the balance of payments. The international influences which affect the local mining sector are analysed, which is followed by an assessment of the role multi-national corporations play in the mining industry.

10.1 THE SIGNIFICANCE OF MINERAL EXPORTS

10.1.1 MINING'S CONTRIBUTION TO TOTAL MERCHANDISE EXPORTS

In chapter three it was established that on average more than 90 per cent of the output of the mining industry is exported. Exports, therefore, remain the mainstay of the mining industry and of the export orientated economy as a whole. Table A.6 in the statistical appendix shows that the commodity exports of the country increased from R41 million in 1950 to R1570 million in 1985, and that mineral exports increased from R22 million to R1283 million during the same period. The percentage share of mineral exports in total commodity exports thus increased from 53 per cent in 1950 to 82 per cent in 1985. Figure 10.1 gives details of the value of mineral exports and the percentage share of mineral exports in total merchandise exports.

FIGURE 10.1 - VALUE OF MINERAL EXPORTS



SOURCE: TABLE A.6

Owing to the fact that the share of agricultural exports in total merchandise exports dropped from 36 per cent in 1950 to about 8 per cent in 1985, the growing role of mineral exports in absolute terms and as percentage of total exports has had as an immense stabilising effect on the balance of payments and on income generation in the economy of

SWA/Namibia.

10.1.2 MINING'S CONTRIBUTION TO THE BALANCE OF PAYMENTS

Another way of looking at the role mining plays in SWA/Namibia's economy in relation to the rest of the world is to analyse the contribution of mining to the balance of payments, taking into account the imports resulting from mineral production and from the investment in fixed capital goods in the mining industry.

The direct imports of intermediate goods by the mining industry are said to be minimal, owing to the policy adopted by some large mining enterprises of giving preference to the local industry rather than to direct imports. This section, however, is not concerned with the question of whether the intermediate and capital outlays in mining are imported directly or acquired through local dealers, because the available statistics on "local" purchases by mining companies often refer to purchases made in SWA/Namibia and in South Africa. The fact remains that most of the outlays in mining are imported at some stage or another. In this section estimates are made of these transactions by using certain coefficients of the input-output analysis presented in chapters three and four.

In chapter three mention was made of the fact that the backward inter-industry transactions of mining have limited multiplying effects, owing to the low local content of supplies (current and capital) to the mining industry. In this section estimates are made of these import leakages arising from the inter-industry transactions. In section 3.2.4.2 the effect of import leakages was already mentioned and it was stated that the import leakages are represented by the value of C/γ less the value of D, where C is represented by the intermediate inputs of the mining industry, D by the total value of production resulting from the inter-industry transactions to produce C, and γ by the quotient of E and D, where E in turn is the value added emerging from producing D. Similar estimates can be made for the imports resulting from the capital outlays in the mining industry.

Given these coefficients, it is now possible to estimate the value of imports resulting from mineral production and from capital investment in the mining industry. The results of this analysis are given in table 10.1. Because the imports resulting from mining's current and capital outlays include non-factor services, the exports of minerals also have to be adjusted to include estimates of these services, such as the transport and insurance earnings of minerals exported.

From table 10.1 it appears that throughout the period under discussion the value of mineral exports exceeded the value of imports which arose from mining's acquisition of current and capital outlays. It should

TABLE 10.1 - MINING'S DIRECT AND INDIRECT CONTRIBUTION TO THE BALANCE OF PAYMENTS

YEAR	IMPORTS OF GOODS AND NON-FACTOR SERVICES ARISING FROM:			MINERAL EXPORTS AND EXPORTS OF NON-FACTOR SERVICES			MINING'S TRADE AND SERVICE BALANCE	MINING'S FACTOR PAYMENTS	MINING'S CURRENT ACCOUNT BALANCE
	MINING'S CURRENT OUTLAYS	MINING'S CAPITAL OUTLAYS	TOTAL IMPORTS	MINERAL EXPORTS	NON-FACTOR SERVICES	TOTAL EXPORTS			
1970	-25.6	-9.6	-35.2	127.2	6.7	133.9	98.7	-18.3	80.4
1971	-26.0	-4.7	-30.7	107.5	5.7	113.2	82.5	-21.5	61.0
1972	-34.9	-8.3	-43.2	147.8	7.8	155.6	112.4	-7.0	105.4
1973	-38.6	-15.3	-53.9	226.1	11.9	238.0	184.1	-8.8	175.3
1974	-71.6	-52.2	-123.8	229.9	12.1	242.0	118.2	-21.4	96.8
1975	-69.6	-108.2	-177.8	241.3	12.7	254.0	76.2	-27.3	48.9
1976	-115.8	-87.2	-203.0	298.1	15.7	313.8	110.8	-69.2	41.6
1977	-220.0	-68.1	-288.1	581.0	30.6	611.6	323.5	-95.8	227.7
1978	-148.8	-78.9	-227.7	730.0	38.5	768.5	540.8	-150.8	390.0
1979	-235.8	-45.3	-281.1	821.0	43.3	864.3	583.2	-153.5	429.7
1980	-275.9	-96.6	-372.5	908.4	47.9	956.3	583.8	-130.1	453.7
1981	-260.0	-64.9	-324.9	657.4	34.7	692.1	367.2	-85.1	282.1
1982	-286.7	-40.8	-327.5	755.4	39.8	795.2	467.7	-100.5	367.2
1983	-252.8	-33.2	-286.0	712.9	37.6	750.5	464.5	-56.9	407.6
1984	-392.4	-25.5	-417.9	851.6	44.9	896.5	478.6	-92.7	385.9
1985	-399.4	-26.1	-425.5	1283.3	67.7	1351.0	925.5	-271.3	654.2

SOURCE OF BASIC DATA: Tables A.5; A.6; A.46 and S.3 to S.9, Department of Finance (1986a: 24).

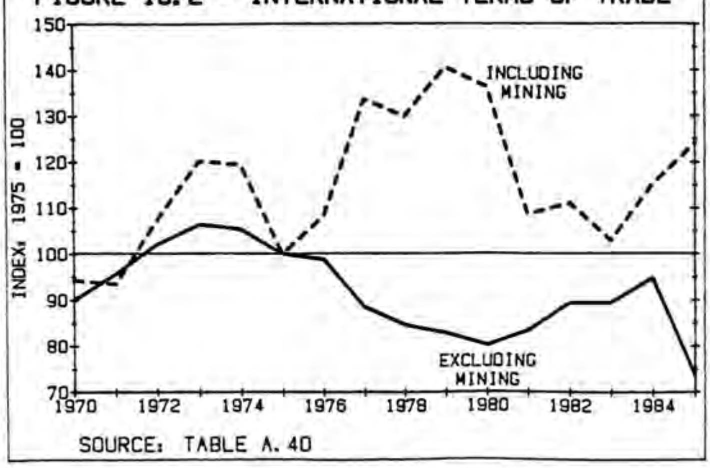
be stressed that the imports presented in table 10.1, include direct and indirect imports from all sectors in the economy and not only those directly attributable to mining's acquisition of capital and intermediate inputs. What is striking though is the fact that during the mid-'seventies when the capital outlays in mining as well as the resulting imports increased sharply, the value of mineral exports still covered the value of imports during those years.

Up to this stage only mineral exports in relation to the trade and service balance were examined, but if this investigation is taken a step further by accounting for mining's net factor payments to the rest of the world, a complete picture of mining's contribution to the current account of the balance of payments emerges. For the purposes of this exercise it is assumed that mining's interest and dividend earnings are all from external sources and that all interest and dividend payments are made to non-residents. The net outflows of factor payments make a considerable difference to the net earnings of foreign exchange. During years of relatively high outflows, the net foreign exchange earnings, after accounting from import leakages and net factor payments, were as low as 13 per cent (1976) of the original value of mineral exports plus the resultant non-factor earnings. Conversely, during years in which foreign exchange leakages were relatively low, as much as 74 per cent (1973) of the original export earnings was retained. For the period 1970 to 1985 as a whole only 47 per cent of the mineral export earnings was retained. This analysis thus shows that mining is a substantial net earner of foreign exchange for the country. However, the highly open economy and the fact that the majority of local mining companies is foreign owned, is reason for concern, since more than half of mining's export earnings leaves the country in the form of imports and dividend and interest payments. The only way to rectify this anomaly is through the promotion of import replacing industries (see section 3.4.1) and local ownership of mining companies (see section 9.4).

10.1.3 MINING'S ROLE IN THE INTERNATIONAL TERMS OF TRADE

A comparison of the terms of trade was examined in chapter seven when prices and cost in mining were discussed. In that section the conclusion was reached that the international terms of trade were affected favourably owing to the fact that the average mineral export prices rose much faster than import prices and even faster than the export prices of non-mineral commodities. Figure 10.2 illustrates this trend. It appears that the terms of trade excluding mineral exports did not have a very favourable influence on the economy, whereas the terms of trade including mineral exports moved in favour of the country for most of the period concerned. In addition, the effect of the recession, which commenced during 1981, emerges from the figure, judging from the declining overall terms of trade which were mainly brought about by the declining diamond export prices. It thus appears from this analysis and from the one in section 7.3 that mining has on average a favourable influence on the international terms of trade, but that, owing to the predominance of mineral exports in total exports, the terms of trade tend to be unstable. The price instability of SWA/Namibia's exports is also induced by various shorter term factors like the international business cycle, the type of marketing channel (i.e. free-market or cartel) and the international level of mineral stocks. These influences are examined in section 10.2.

FIGURE 10.2 - INTERNATIONAL TERMS OF TRADE



SOURCE: TABLE A.40

The analysis of the terms of trade would be incomplete without mentioning that the favourable terms of trade of SWA/Namibia was mainly made possible by the above average price increases of diamonds and uranium. If these two export commodities were excluded, the terms of trade would have been far less favourable. Research done by Thirlwall and Bergevin (1985: 807-813) support the view that, excluding petroleum, the terms of trade of primary commodities have deteriorated in the post-war years and are continuing on this long-term historical trend. They further conclude that the prices of primary products are more cyclical than those of manufactured products and that the degree of cyclicality has been greater for less developed countries than for developed countries. This primary product price instability creates uncertainty which in turn retards industrial growth if the terms of trade become unfavourable.

The unfavourable long-term prospect of the terms of trade of SWA/ Namibia and the price instability of primary products again support the view expressed in chapter three, namely that urgent consideration should be given to industrial development in which the beneficiation of raw materials could be of particular importance.

10.1.4 MINERAL EXPORTS AS FOREIGN EXCHANGE EARNER

Since mining is the single most important foreign exchange earner, it is important to know who the trading partners of SWA/Namibia's mineral exports are. This information is not only important for market research, but also for the formulation of a future exchange rate policy after independence.

Information about the countries to which minerals are exported is available for the period 1970 to 1984 for all minerals, except for diamond and uranium exports. Certain sources, however, have tentative indications of the countries importing local diamonds and uranium and a consolidated view of all trading partners will be presented later in this section. Analysing the rest of mineral exports, it appears that for the period 1970 to 1984 as a whole, South Africa was the largest single trading partner of local mineral exports, followed by Belgium, West Germany, Japan and the USA. These statistics are contained in table A.54 in the statistical appendix from which it may be deduced that during the period under discussion minerals were exported to 37 different countries. Further it appears that exports to the European Community as a whole are larger than those to the South African customs union.

The classification of the annual exports by country, summarised in table 10.2, shows up a fairly stable distribution between various trading partners. South Africa remains a strong trading partner throughout the period, but this is mainly through its association with

TABLE 10.2 - MINERAL EXPORTS BY COUNTRY OF DESTINATION (EXCLUDING DIAMOND AND URANIUM EXPORTS) - R ' 000

YEAR	WEST GERMANY	BELGIUM	OTHER EC	OTHER EUROPE	U.S.A.	JAPAN	SOUTH AFRICA	ALL OTHER	TOTAL
1970	5,614	4,009	7,777	814	14,890	16,370	8,263	48	57,785
1971	3,695	6,052	7,790	1,139	9,725	9,232	8,987	24	46,644
1972	2,004	12,745	6,292	1,142	9,753	7,592	10,689	26	50,243
1973	4,802	8,908	8,834	1,443	13,999	10,157	16,826	40	65,009
1974	8,048	9,195	9,389	3,921	22,798	12,463	29,120	134	95,068
1975	11,015	3,941	5,086	1,935	26,621	9,282	26,906	82	84,868
1976	19,013	17,482	15,450	1,334	350	7,994	28,200	121	89,944
1977	20,988	20,155	25,523	373	381	6,274	27,231	684	101,609
1978	24,595	6,617	37,652	4,871	2	13,742	32,919	785	121,183
1979	23,736	21,326	25,987	15,563	2	28,152	45,675	589	161,030
1980	27,874	44,159	16,439	10,178	431	30,487	48,471	608	178,647
1981	21,795	34,030	7,991	11,161	863	15,132	46,811	664	138,447
1982	35,411	32,749	6,879	19,942	596	21,792	40,535	576	158,480
1983	37,061	68,984	7,211	10,895	106	19,195	33,147	734	177,294
1984	53,228	52,841	10,014	15,490	4,001	18,046	48,975	307	202,902
					PERCENTAGE				
1970	9.7	6.9	13.5	1.4	25.8	28.3	14.3	0.1	100.0
1971	7.9	13.0	16.7	2.4	20.8	19.8	19.3	0.1	100.0
1972	4.0	25.4	12.5	2.3	19.4	15.1	21.3	0.1	100.0
1973	7.4	13.7	13.6	2.2	21.5	15.6	25.9	0.1	100.0
1974	8.5	9.7	9.9	4.1	24.0	13.1	30.6	0.1	100.0
1975	13.0	4.6	6.0	2.3	31.4	10.9	31.7	0.1	100.0
1976	21.1	19.4	17.2	1.5	0.4	8.9	31.4	0.1	100.0
1977	20.7	19.8	25.1	0.4	0.4	6.2	26.8	0.7	100.0
1978	20.3	5.5	31.1	4.0	.0	11.3	27.2	0.6	100.0
1979	14.7	13.2	16.1	9.7	.0	17.5	28.4	0.4	100.0
1980	15.6	24.7	9.2	5.7	0.2	17.1	27.1	0.3	100.0
1981	15.7	24.6	5.8	8.1	0.6	10.9	33.8	0.5	100.0
1982	22.3	20.7	4.3	12.6	0.4	13.8	25.6	0.4	100.0
1983	20.9	38.9	4.1	6.1	0.1	10.8	18.7	0.4	100.0
1984	26.2	26.0	4.9	7.6	2.0	8.9	24.1	0.2	100.0

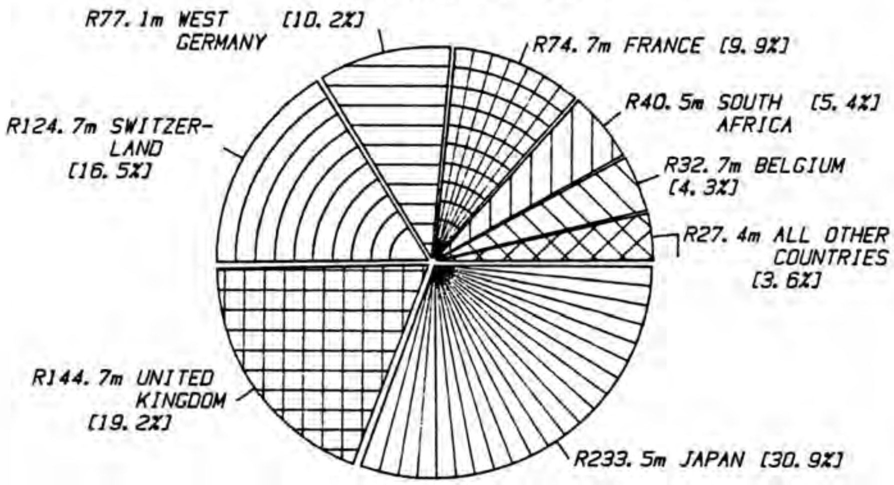
SOURCE: Table A.53.

the Uis and Rosh Pinah mines, which are owned by the South African State corporation, ISCOR, and through the purchases of minerals in which it is poorly endowed, viz. lead, arsenic, cadmium and salt. Most of the mines that are foreign owned, particularly by non-South Africans, export mainly to countries other than South Africa. For unknown reasons the USA who once was a major trading partner, has become a minor trading partner since 1976.

Finally, an attempt is made to get a tentative indication of total mineral exports by country of destination for 1982 - the last year for which information of countries importing local diamonds and uranium was obtainable. According to the South African Department of Finance (1983: 5) diamond exports are destined for the United Kingdom and

Switzerland in the ratio of 43 to 57 per cent, respectively, whereas less than one per cent was exported to Belgium. Uranium exports, as reported by the Catholic Institute (1983: 39), leave for Japan (56 per cent), followed by France (20 per cent), the United Kingdom (13 per cent) and West Germany (11 per cent). This analysis, graphically illustrated in figure 10.3, shows that Japan is the largest trading partner of SWA/Namibian minerals, with a share of 31 per cent, followed by the United Kingdom, Switzerland and West Germany with respective shares of 19, 17 and 10 per cent. South Africa is the sixth largest trading partner, importing about 5 per cent of the total value of local mineral exports. The inclusion of uranium and diamond exports thus makes a considerable difference to the export shares, owing to the size of these exports, namely 79 per cent of the total value of mineral exports in 1982.

FIGURE 10.3 - TOTAL MINERAL EXPORTS BY COUNTRY OF DESTINATION - 1982



SOURCE: TABLE A.53; CIIR, 1984: 39; DEPARTMENT OF FINANCE - S.A., 1983: 5.

This analysis showed the relative importance of industrialised countries in SWA/Namibia's mineral exports and it was established that Japan and the European Community feature most prominently as purchasers of the country's minerals. These pre-independence commercial contacts could prove to be most valuable to establish export markets after independence, when it is hoped the fluid political climate will have been settled. However, further market research is needed to determine the specific demands of the trading partners and to determine whether the existing trading partners are in fact offering market related prices.

10.2 INTERNATIONAL INFLUENCES ON MINERAL PRODUCTION

During the previous chapters it was frequently mentioned how the local mining industry is influenced by forces that work from outside the economy, the so-called extraneous or exogenous influences. In this section some of these forces or influences are discussed briefly to obtain a better impression of the international constraints imposed on the local production of minerals.

10.2.1 ECONOMIC PERFORMANCE OF THE WESTERN WORLD

Because such a large proportion of the mineral output of SWA/Namibia is exported, the state of the economies of its trading partners plays a major role in the performance of the local mining industry. In this section an attempt will be made to estimate the relationship between local mineral production and industrial production of the Western World.

The economic performance of the trading partners of SWA/Namibia's exports, however, seems to have an impact only on the production of minerals other than diamonds and uranium. The production of diamonds (the majority of which are gem diamonds), is fairly insensitive to business cycles in the industrialised countries. The obvious reason for this inclination may be found in the following factors:

(a) Since diamonds produced in SWA/Namibia are of good quality and are generally larger than diamonds produced in the rest of the world, their demand is prone to the demand for and fashions in jewellery in the major trading centres. Since the better quality stone can serve as an investment medium, its demand is also affected by international monetary developments, like the price of gold and the value of the U.S. dollar.

(b) The diamond output may easily be stockpiled and sales of diamonds may be staggered in an attempt to suit international demand and to keep international prices stable irrespective of the trend in the international business cycle.

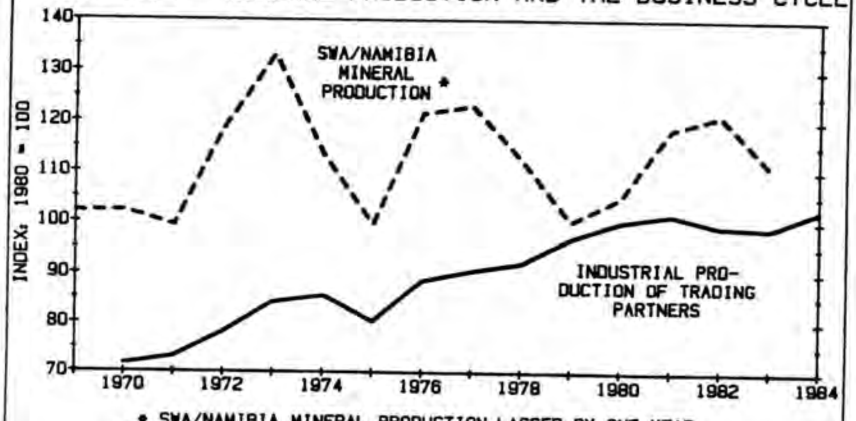
The output of uranium is also insensitive to international business cycles, owing to the fixed nature of the long-term contracts which have to be met at more or less fixed quantities. Consequently, the production of uranium, in contrast with the production of other minerals, has a stabilising influence on the economic performance of SWA/Namibia in the short to medium-term. The long-term prospect of uranium mining, however, may have disastrous effects on the economy, if no new (or rather generous) contracts can be found, as was established in section 3.3.

As far as the other minerals are concerned, there is a closer relationship between local mineral production and the industrial production of mining's trading partners. Obviously the correlation between the two variables is not very strong, owing firstly to the comprehensiveness of the industrial production of the trading partners in which metals and minerals only carry a small weight and secondly to the increasing role of stockpiling in leading or prolonging mineral production.

Nevertheless, a comparison has been made between the two variables and there seems to be a slight coincidence, particularly if SWA/Namibia's mineral production is lagged by one year. This means that the local mining industry experiences an increase in production a year after an upswing in the industrial production of the trading partners, or vice versa. Industrial production in this context is defined as the weighted average index of the volume of manufacturing production of the major industrial countries - weighted according to the importance of each country's purchases of local mineral (see table A.67).

Figure 10.4 gives details of the trend of the two variables, with the local mineral production lagged by one year. The coincidence of the 1974/75 recession is particularly evident from the graph. It also appears that the cyclic trend of international industrial production has a fairly strong influence on local mineral production. This is evidenced by the pronounced way in which local mineral production reacts (and sometimes even over-reacts) to changes in the international business cycle.

FIGURE 10.4 - MINERAL PRODUCTION AND THE BUSINESS CYCLE



* SWA/NAMIBIA MINERAL PRODUCTION LAGGED BY ONE YEAR.
SOURCE: TABLE A.12; UNITED NATIONS.

A more recent development, however, is that large mining companies time their investment programmes anti-cyclically to the phase of the international business cycle. This policy is particularly evident with the Tsumeb mine, which expands its mining and smelting capacity during the down-turn in the world economy. This policy involves a considerable degree of risk, particularly in the non-ferrous base metal market, but can work out profitable if the planning is done with the necessary caution and with professional foresight.

10.2.2 EXCHANGE RATE INFLUENCES

In recent years exchange rates have had a major impact on the performance of the mining industry. Mineral output prices, which were examined in chapter seven, are influenced not only by demand and supply factors, but the prices realised locally also include the effects of changes in the exchange rate.

Because of the importance of the US-Dollar as an internationally accepted currency, SWA/Namibia's Rand mineral export earnings (excluding those to the Rand Monetary Area) are valued in this currency to establish how the exchange rate influences have affected the export earnings.

Expressing the rand value of exports in dollar terms and revaluing this at the 1975 exchange rate, it is possible to get a rough idea of the exchange rate influence on the export earnings of SWA/Namibia. Table 10.3 indicates the actual rand value of export earnings and the rand value of export earnings at the 1975 rand/dollar exchange rate.

TABLE 10.3 - EXCHANGE RATE INFLUENCE ON VALUE OF MINERAL EXPORTS (EXCLUDING EXPORTS TO SOUTH AFRICA)

YEAR	VALUE OF EXPORTS AT CURRENT EXCHANGE RATE (R millions)	EXCHANGE RATE ($1 = R..)	VALUE OF EXPORTS AT CURRENT EXCHANGE RATE ($ millions)	VALUE OF EXPORTS AT 1975 EXCHANGE RATE (R millions)	PERCENTAGE DEVIATION (%)
	(1)	(2)	(3) (1)/(2)	(4) (3)x0.7398	(5) [(1)/(4)]
1970	118.9	0.7164	166.0	122.8	-3.2%
1971	98.5	0.7132	138.1	102.2	-3.6%
1972	137.1	0.7729	177.4	131.2	4.5%
1973	209.3	0.6944	301.4	223.0	-6.1%
1974	200.7	0.6795	295.4	218.5	-8.2%
1975	214.4	0.7398	289.8	214.4	0.0%
1976	269.9	0.8696	310.4	229.6	17.5%
1977	553.8	0.8696	636.8	471.1	17.5%
1978	697.1	0.8696	801.6	593.0	17.5%
1979	775.3	0.8420	920.8	681.2	13.8%
1980	859.9	0.7780	1105.3	817.7	5.2%
1981	610.6	0.8719	700.3	518.1	17.9%
1982	718.0	1.0836	662.6	490.2	46.5%
1983	687.2	1.1141	616.8	456.3	50.6%
1984	808.9	1.4757	548.1	405.5	99.5%
1985	1218.4	2.2279	546.9	404.6	201.1%

SOURCE: Value of exports from table A.53. Exchange rates from various issues of the Quarterly Bulletin of the S.A. Reserve Bank.

For the greater part of the period indicated, the actual export earnings were in fact higher than those calculated at a constant 1975 exchange rate. The rand value of export earnings was therefore influenced positively by the weakening rand exchange rate against the dollar, particularly since 1981. Later the external value of the rand deteriorated to such an extent that by 1984 the actual export earnings were twice as large and by 1985 three times as large as those calculated at a constant 1975 exchange rate. This suggests that much of the effects which were ascribed to output price increases in chapter seven (and which were indicated in figure 7.1), were to a large extent brought about by changes in the exchange rate and not only by supply and demand forces. It is difficult, however, to say how the unit value of output was influenced by genuine price factors on the one hand and by exchange rate factors on the other. Nevertheless, these examples suffice to demonstrate that exchange rates do play an important role in the performance of the mining industry. The appreciation of the dollar against the rand since 1981 has therefore influenced the local mining industry positively as far as the rand value of exports outside the Rand Monetary Area is concerned, but since this paradoxical exchange rate situation has made local mineral exporters artificially more competitive against those in other countries, a rapid improvement in the exchange rate could have the opposit effect on local producers and could land them into serious cost and cash flow difficulties. Instead of preparing themselves for such an event by creating contingency reserves, mining companies pursued a highly liberal financial policy during 1985 by declaring the bulk of their windfall profits to shareholders.

10.2.3 TECHNOLOGICAL INFLUENCES

Apart from the influences related to international trade and finance, the technological progress in the industrialised countries also has an important long-term effect on the mineral production of SWA/Namibia. Continued research is being done on the raw materials of industrial production, which entails *inter alia* the finding of better or cheaper substitutes for the minerals and metals presently in use. In the industrial processes many minerals become obsolete, because of new applications and amplifications of other minerals which do the job as well, if not better, or are cheaper and more abundant.

Some of these substitutes used in the industrial processes, which have either already affected or are potential "threats" to local mineral production, are given by Bosson and Varon (1984: 60) and are as follows:

Minerals produced in SWA/Namibia	Substitutes
Copper	Aluminium, steel, plastics.
Lead	Cadmium, nickel, mercury, silver, zinc and plastics.
Tin	Steel, aluminium, copper, lead, glass and paper.

[List continued on next page]

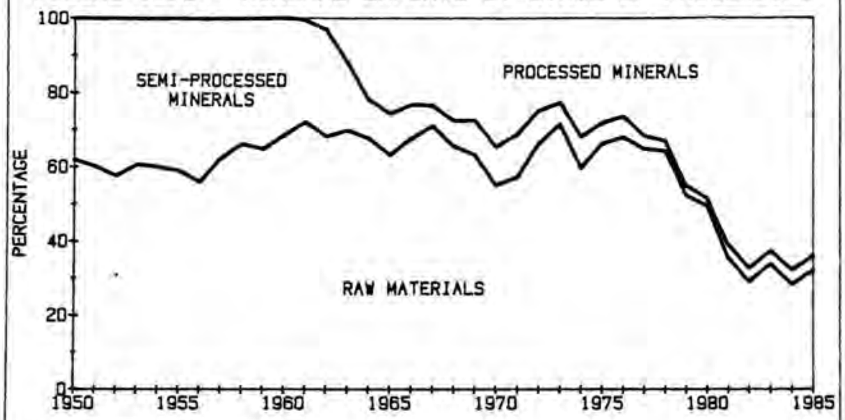
Minerals produced in SWA/Namibia	Substitutes
Zinc	Cadmium, magnesium, steel, aluminium and plastics.
Germanium	Silicon.
Uranium	Coal, natural gas and crude oil.
Diamonds	Synthetic materials.

To quantify the extent to which the local mining industry was affected by these technological changes, does not fall within the scope of this thesis, since this requires additional micro-economic investigations. However, a typical example of mineral substitution which has occurred with the mineral germanium may be mentioned briefly. The Tsumeb mine has the largest resources of germanium in the world and during the early 'sixties it produced and exported 98% pure germanium at an attractive price of up to R93 500 per tonne - a price never reached by another locally produced metal, not even by uranium at today's prices. Germanium is used in the manufacture of computer transistor diodes, rectifiers and infra-red optics (cf. table S.1). Owing to the technological advancement in computor technology, silicon was being substituted for germanium. This process led to the drop in the price of germanium to about R32 000 per tonne during the late 'sixties and later to the abandoning of germanium production during 1969. However, according to the most modern computor technology (cf. Economist, 1984: 79), silicon in turn may be substituted by gallium arsenide, a metal presumably also occurring in the Tsumeb mine. How this will affect the mineral production in future, remains to be seen.

It is clear therefore, that the production of local metals and minerals is extremely vulnerable to the technological progress in industrial countries. In addition, the rising long-term trend in recovery of metals from wastes is posing an increasing threat. Recycling affected the primary production of virtually all ferrous, non-ferrous and precious metals. This is reflected by the fact that the production of secondary copper in total copper consumption expanded from about 10 per cent at the turn of the century to 35 per cent in 1970 (Varon, 1975: 18).

Technological changes, however, are also at work within the mining industry, in the sense that new mining and mineral processing techniques are employed. The stage of treatment of mineral exports may be taken as a rough indicator of technological progress, i.e. the ratio between raw materials, semi-manufactured and processed minerals. The movement of mineral exports towards processed minerals and away from raw materials should reflect the technological progress in the mining industry. Figure 10.5 gives details of this trend of all mineral exports, and shows that there has been a gradual shift from exports in

FIGURE 10.5 - MINERAL EXPORTS BY STAGE OF PROCESSING



SOURCE: TABLE A. 52

an unprocessed to a more manufactured state since the early 'sixties. The establishment of the smelter at the Tsumeb mine has contributed significantly to this change. Certain metals like copper, lead and silver since then have not been exported in concentrated form (semi-processed), but as refined metals. The smelting process therefore substituted processed exports for semi-processed exports and thereby gained considerable advantages in additional value being added locally and in higher export earnings. At present only zinc and tin are still being exported as concentrates. Figure 10.5 also indicates the upward trend in processed minerals since the late 'seventies, which was mainly the effect of the increased uranium exports. Rough diamond exports are included under raw materials, hence the large share of raw materials in total exports. As was mentioned in chapter three, further processing of rough diamonds would bring considerable advantages to the local economy. It was mentioned that the local sorting and valuation as well as the cutting and polishing of diamonds could be added to the production of diamonds, which, as happened with the introduction of the metal smelter at Tsumeb, would increase the share of processed minerals in total mineral exports and thereby increase value added and export earnings.

If the exports of diamonds and uranium are excluded (see table A.52a), the movement from raw materials and semi-processed materials to processed metals is even more pronounced. This analysis illustrates that during the 'fifties processed metals constituted less than one per cent of total mineral exports. This share increased to 60 per cent in the 'sixties, to 80 per cent in the 'seventies and has stood at 84 per cent during the first six years of the 'eighties. To increase this share even further in future, will depend on the possibility to obtain the economies of scale in the mining of certain minerals to warrant the commissioning of processing facilities. It will also depend on whether the necessary technological and financial resources can be acquired. The externalities associated with the refining and smelting of certain metals, which have contributed to the shift of processing facilities from developed to developing countries, may also lead to a faster development in the processing of minerals locally.

10.2.4 INTERNATIONAL COMPETITION

Yet another influence which is amalgamation of more or less all the effects described above, is that of international competition in the mineral markets of the world, which is expressed in changes in the market share of a country in total mineral production.

Changes in a country's market share in the world production of certain minerals may occur as a result of various factors of which some are:

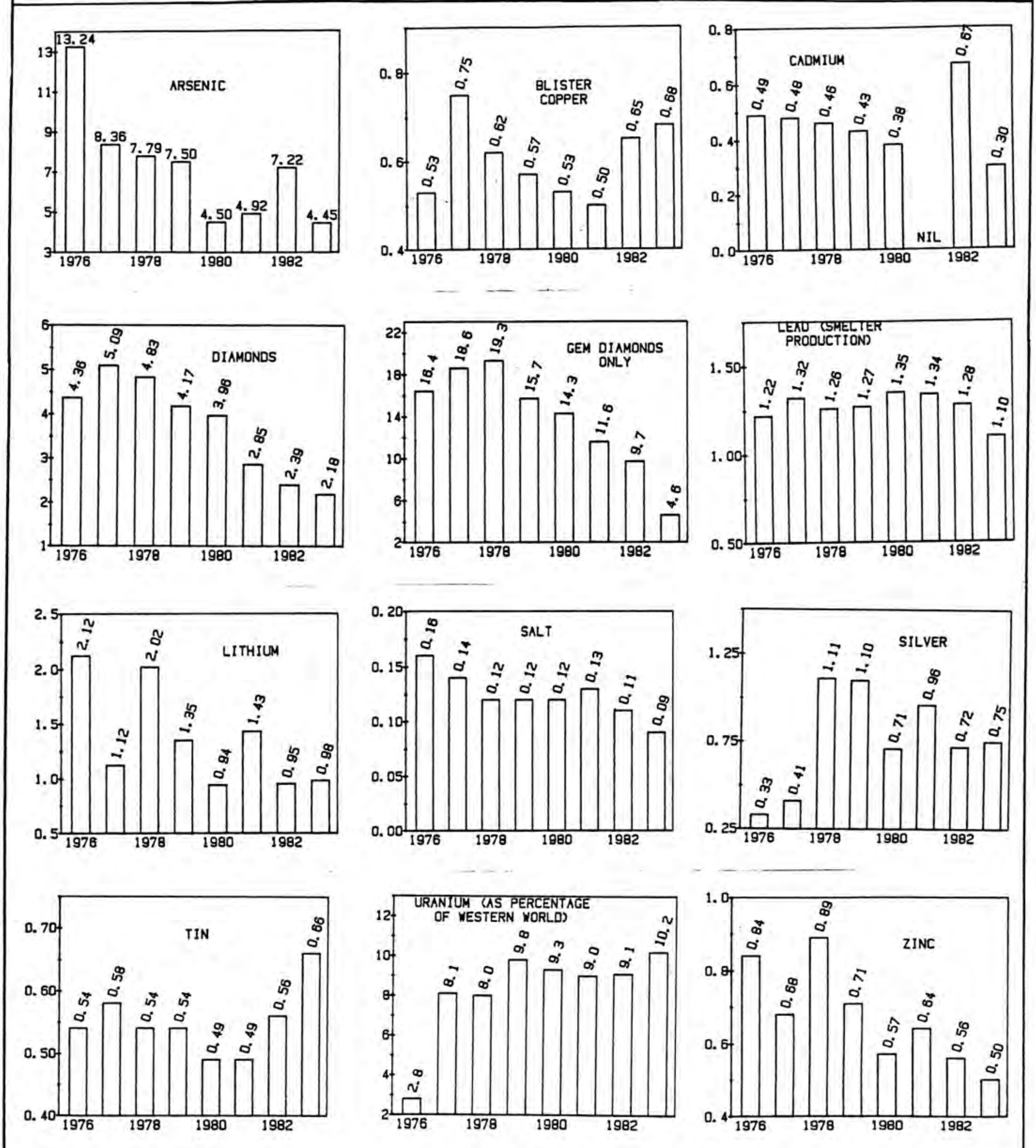
- advanced technological methods employed in the mining process in other countries;
- new mines being commissioned which produce more and cheaper ores;
- mineral products that are inferior in quality, or ironically enough, superior in quality, as is the case with diamonds produced locally which are currently in poor demand;
- domestic economic problems such as excessive inflation compared with that of competitors or exchange rate problems and/or
- domestic political problems associated with hostilities, which may cause clients to cancel contracts out of fear for non-delivery.

Changes in the market share of local mineral production in total world production of certain selected minerals may be taken as an approximation of the effect international competition has on local mineral production. These shares are presented in figure 10.6.

The minerals in which SWA/Namibia has a one per cent or more share in world production are uranium, diamonds, arsenic, lithium and refined lead (in descending order).

Except for uranium where SWA/Namibia shows an increasing share in the uranium production of the Western World, a declining share in the world production of most other minerals has been recorded. The sharpest decline in the market share can be observed in the production of gem diamonds, where the SWA/Namibian share declined from almost 20 per cent in 1978 to less than 5 per cent in 1983. The market share of gem diamonds declined gradually from 1978 to 1982, but showed a drastic drop in 1983; this was due mainly to the decrease in the production of diamonds in SWA/Namibia on the one hand and on the other hand a sharp increase in diamond production by Australia and Botswana.

FIGURE 10.6 - SWA/NAMIBIA'S PERCENTAGE SHARE IN WORLD MINERAL PRODUCTION



SOURCE: TABLE A.56

The market shares during 1982 and 1983 were 0,7 per cent and 10,3 per cent for Australia and for Botswana, 11,2 per cent and 20,4 per cent. The competition from these two countries in particular made SWA/ Namibia a minor gem diamond producer. After years in which SWA/ Namibia remained the third largest producer of gem diamonds after South Africa and the USSR, it now holds only sixth position in the world production of gem diamonds. Apart from the international competition as a reason for the sharp decline in SWA/Namibia's diamond production, the allegations currently being made that the local diamond resources are nearing the stage of depletion, may also hold some truth.

The mixed fortunes of the market shares of other minerals may also to a certain extent be ascribed to falling ore grades in the major mining operations and to the fact that no new mines are being commissioned despite a considerable number of known deposits. A major reason for the declining market share, however, must also be sought in the prevailing uncertain political climate, in which mining companies are awaiting independence to establish the nature of the future economic and political system, before new mining projects are ventured upon.

10.3 THE ROLE OF MULTI-NATIONAL CORPORATIONS

10.3.1 FOREIGN OWNERSHIP OF THE MINING INDUSTRY

One aspect which frequently draws criticism is the extent to which the SWA/Namibian mining industry is foreign owned. In chapter nine the conclusion was reached that one of the reasons for the high degree of foreign ownership was the fact that financial institutions in SWA/ Namibia are not sophisticated enough to convey surplus funds from non-mining to mining sectors. A second reason is the "closed shop" attitude adopted by most multi-national mining companies.

Unfortunately no information is available on the share of foreign investment in relation to local investment in the mining industry. However, more information is available on the value of foreign investment in the local mining industry, which was made available by the South African Reserve Bank (1983: 7) from a survey conducted during 1981. Certain adjustments had been made by the author in the original data to fit into the national accounting framework of SWA/Namibia. Details of the foreign liabilities of the local mining industry are contained in table A.55 in the statistical appendix. The table shows that on 31 December 1980 the foreign liabilities of the local mining industry amounted to R1163 million of which 95 per cent were of a long-term nature. Only 11 per cent of the long-term liabilities are in the form of ordinary and other shares (at nominal value), whereas the share premium, reserves and undistributed profits amount to 72 per cent of total long-term liabilities, which is a good reflection of the profitability of the mining industry after tax and dividends.

Another unpublished survey by du Plessis (1980: 12) indicates that R785 million or two-thirds of the foreign liabilities of the mining sector was owed to South Africa at the end of 1980. Furthermore, the foreign liabilities of mining at that stage amounted to more than 60 per cent of the total foreign liabilities of SWA/Namibia. It also appears from the du Plessis-survey that 64 per cent of South Africa's total investment in SWA/Namibia was invested in the local mining industry.

10.3.2 THE ROLE OF MULTI-NATIONAL CORPORATIONS IN THE LOCAL MINING INDUSTRY

Corporations which own and/or control the majority of local mining, prospecting and holding companies associated with the mining industry are given by Sparks and Murray (1985: 38-52) as follows:

- De Beers (South African)
- Rio Tinto Zinc (British)
- Rio Algom (Canadian)
- Compagnie Francaise des Petroles - Total (French)
- Urangesellschaft (West German)
- Goldfields (South African)
- Industrial Development Corporation (IDC) (South African). [The voting shares held by the IDC in Rössing Uranium Limited have been acquired by the SWA/Namibian authorities recently (SWA/Namibia Information Service, 1985: 8).]
- Gencor (South African)
- British Petroleum (British)
- Iron and Steel Corporation (ISCOR) (South African)
- Kloekner (West German)
- Metorex (American)
- Newmont (American)
- Johannesburg Consolidated Investments (JCI) (South African)
- Anglo American Corporation (South African)

Most of the corporations operating from South Africa are in turn owned to some degree by overseas corporations. Corporations such as the IDC and ISCOR cannot be regarded as multi-national, but, still they are important enterprises in the country of origin.

The importance of multi-national corporations in SWA/Namibia is illustrated by the fact that the value of mineral production is concentrated among a few large mining companies. Consolidated Diamond Mines (CDM) and Rössing Uranium Limited (RUL) accounted for 76 per cent of the value of mineral sales during 1985, and during the same year the six largest mining companies, all of which are associated with some of the corporations listed above, had a combined share of more than 95 per cent in the total value of mineral sales. This clearly illustrates that the overwhelming part of the mineral production in SWA/Namibia, originates from companies which are owned by, or associated with multi-national or large corporations that have their principal activities and interests in developed countries.

The distinctive characteristic of a multi-national corporation is that it is not based in one country alone, but extends its activities to different host countries in order to spread the profits and risks over the corporation as a whole. Multi-nationals, which originate mainly from developed countries, are particularly active in the mining industry of developing countries for a number of reasons.

> The first reason stems from the historical development of mining ventures in colonial and undeveloped territories where some operational control has been retained to the present day.
>
> The second, is the desire to establish security of supply of mineral inputs into the "downstream" processing and fabricating facilities which are largely located in the developed countries (Freyman, 1974: 21).
>
> Thirdly, because the principal users of minerals are the industrialised countries, the initiative for mineral production originates from them.
>
> Fourthly, multi-nationals have acquired the necessary skills and techniques required to develop and operate large mining ventures.
>
> Fifthly, substantial capital is required for large mining operations. Large international companies usually have access to capital owing to their creditworthiness and their involvement in the financial markets.
>
> Sixthly, multi-nationals have easier access to world markets.
>
> Finally, developing countries tend, often under pressure from multi-nationals, to grant concessions to one or a few large companies, rather than to a number of smaller companies (Bosson & Varon, 1984: 45).

These seven factors also apply to the situation in SWA/Namibia where mineral production, as was established above, is concentrated among a few multi-national or foreign corporations.

The fundamental philosophy of multi-national corporations is a good one and its advantages are obvious. The disadvantages of multi-nationals, however, are not obvious and are often difficult to visualise, making it difficult for developing countries to evaluate the advantages and disadvantages of these corporations.

The question thus arises whether there are any comparative advantages in commissioning a multi-national corporation as against existing local expertise in the mineral resources sector. The latter method may not be discarded as impossible, because the financial resources may be obtained by development aid or loans, and engineers, geologists and other specialists may be hired. However, it must be admitted that multi-national corporations have considerable advantages over local companies that are dependent upon foreign or government aid or loans and that are committed to the services from a number of smaller firms. In a number of developing countries development aid has failed in its principal objective for a number of reasons: "... the wrong priorities chosen by the developing countries; the emphasis on prestige projects which gave no early return on investment; the neglect of rural development; and, all too frequently, the misuse of funds either because leading countries imposed expensive strings or because funds were siphoned off for personal use." (Etheredge, 1985: 10).

The first advantage of the multi-national corporation over a conglomerate of smaller firms, is that the corporation is more often better able to provide the whole range of services, such as exploration, planning and construction of the mining site, shaft sinking, mineral processing and marketing and auxiliary services, such as provision of housing, transport and catering. The corporation which is able to provide all these services itself or through subsidiary companies, therefore enjoys a considerable cost advantage. These corporations on the other hand, are also in a very strong bargaining position when it comes to negotiating fiscal arrangements.

Secondly, because the multi-national corporation has spread its risk of new ventures over several projects and in different host countries, the risk involved in establishing a new mining project is small compared with a firm which operates only one project in one country alone. The present uncertain political outlook in SWA/Namibia has lead to the situation where the domestic investment from local business enterprises has declined sharply, whereas multi-nationals are still showing a considerable degree of interest in mining ventures, albeit on a much smaller scale than during the mid-'seventies.

Thirdly, the multi-national with its knowledge of the market is more likely to sell the final product to the best buyer for the best possible price than the smaller firm, who does not know all the aspects of marketing minerals internationally. This applies also to the technological know-how found in multi-nationals in several other fields of the mining industry.

Fourthly, government planning agencies find that the statistics necessary for planning which are obtained from large, well organised corporations are often more reliable than those of numerous smaller producers (Harvey, 1980: 38).

Finally, because the multi-national corporation deals internationally with labour, it has frequently adopted an internationally acceptable labour policy and maintains good labour relations with the work force. Multi-nationals operating in SWA/Namibia, particularly those with overseas connections, have done a great deal for labour development in the country and as was established in chapter six, have become wage leaders especially in the unskilled section of the labour force. It is a well known fact that conditions on the mines operated by multi-nationals, are far better than those in some of the mines operated by small local concerns.

There are, however, also some disadvantages associated with multi-national corporations. These may be ascribed mainly to the fact that these corporations are not nationals who endeavour to maximise their advantages in the country where their operations are located, but rather want to gain maximum advantages for the corporation as a whole by spreading advantages and disadvantages over its operations according to the circumstances in each individual host country. In determining the distribution of production between subsidiaries located in different countries a mining company will consider the costs determined by inflation rate, exchange rate and tax rate differentials between host countries. These circumstances may then lead to intrafirm transfer pricing practices. These practices are not easily detected or proved, because world prices for each and every mineral often do not exist.

Because multi-national corporations operate different industries in different countries and because these industries are often interrelated and integrated to produce a chain of related products, attempts by the host country to further beneficiate minerals in their countries may be discouraged by multi-nationals which already have similar companies abroad that buy the raw materials for further treatment. A classic example of what is meant here is the attempts that are frequently made to establish diamond cutting and polishing firms in SWA/Namibia, but which are discouraged by the diamond mining industry. The multi-national corporation will therefore do everything possible to protect its subsidiary from its own competition. The formation of such an integrated chain of companies of multi-nationals therefore seriously hampers attempts by developing countries to develop processing industries through forward integration and other forms of industrialisation discussed in chapter three.

Certain multi-national groups go so far in the integration process that whole concentrations of operations are owned and controlled in order to get oligopolistic control over countries producing raw materials. These conglomerates therefore have a much larger influence on prices of certain commodities and on the host governments in negotiating deals that suit themselves. The formation of cartels operates similarly and the host country is most often the one that gets a raw deal as far as prices, contracts, tax regimes and prospects for future development are concerned.

Finally, the position of many developing countries, including that of SWA/Namibia vis-a-vis multi-national corporations is put aptly by Bosson and Varon (1984: 11) when they say that international companies' decisions have "... not always been consistent with the development needs, legitimate interests, aspirations, and sensitivities of the developing country. The leverage of developing countries over the mining industry has been kept low by the industry's history of guarding its knowledge of reserves and resources, technology and markets, overstressing its complexity to prevent easy intervention. In a number of instances the multi-nationals have been less than candid with regard to the results of exploration, the parameters of investment and expansion decisions, processing and marketing properties of the product, technological and economic trends, and market value. Host countries have thus been deprived of knowledge about their own resources and of the basic tools with which to evaluate decisions deeply affecting their self-interest."

The authorities in SWA/Namibia are still deprived of information about the country's reserves - information that is vital for economic, financial and regional planning. A recent official report on proposed development in Bushmanland and Western Caprivi states that "very little is known about the potential of any possible mineral deposits. However, certain concession areas do exist ... The information about prospecting work in these areas is still confidential" (Directorate of Development Co-ordination, 1984: 77 - own translation). In this case the information could have made an important impact on the proposed and the actual development of these remote and underdeveloped regions, since it is understood that some of these concession areas are being held mostly by multi-nationals for possible future exploitation of diamonds.

10.4 CONCLUSION

The main aim of this chapter was to examine mining's relation with the rest of the world. The chapter first investigated the significance of the mineral exports in the economy of SWA/Namibia. Secondly, because the mineral exports are mainly influenced by exogenous forces, it was necessary to assess the gravity of some of these forces and to try and quantify their impetus. Finally, a brief account of the role of multi-national corporations in the mining was given.

Because mineral exports are not as vulnerable to short-term extraneous influences as are SWA/Namibia's other traditional export commodities, mineral exports have on the whole a beneficial and stabilising effect on the country's export earnings and its balance of payments. Judging from the physical flow of imports and exports arising from mining's production, mining is a substantial net earner of foreign exchange for the country. Taking both direct and indirect import of goods and services into account, mining is still able to cover these imports about 2,5 times by its exports. However, since the majority of local mining companies is foreign owned, a large proportion of the profits leave the country in the form of dividend payments. Taking also these payments into account, it is striking that on average only half of the original export earnings is retained in the country. It was suggested that in order to retain the maximum proportion of the mineral export earnings in the country, import replacing industries and local ownership of mining companies should be promoted.

Mining also has a favourable influence on the country's terms of trade in that it is increasingly supporting and compensating for the unfavourable export prices and terms of trade of the non-mineral exports. However, the prices of primary products are more cyclical than those of manufactured products in world trade and it was suggested that urgent consideration should be given to move away from raw material exports through the beneficiation of existing primary products in an attempt to stabilise export prices and the terms of trade.

An investigation into the various countries purchasing SWA/Namibia's minerals showed up a fairly stable distribution between various countries. It was also established that Japan and the European Community feature most prominently as buyers of the country's minerals. The suggestion was made that more market research is essential to establish future contacts and to maintain technological progress to be able to provide those metals and products thereof which are in demand in industrialised countries.

Having assessed some international influences on mineral production, it was concluded that the economic performance of the industrialised countries affect local mineral production distinctly. However, it is not only industrial production that affects the well-being of the local mining industry, but also the stockpiling of strategic minerals. The business cycle of industrialised countries does not seem to influence the production of diamonds and uranium very severely.

Another factor which is an entirely exogenous governer of the performance of the minerals industry is the exchange rate. The exchange rate is an exogenous variable, since it does not relate to any domestic economic parameter, but is the product of economic and lately also political developments in South Africa. The declining external value of the rand since 1981 has influenced the mineral export earnings positively, but it was warned that a reversal of this situation could mean serious financial difficulties for mineral exporters. An extremely conservative financial policy on the part of mining companies should be adopted through the creation of reserves which provide for financial resources once the exchange rate has improved.

Technological progress is also posing an increasing threat to the mining industry, in that certain minerals presently mined in the country can be substituted by non-mineral materials or by minerals not occurring in the country or by recycled minerals. Associated with the threat of technological progress is the problem of international competition, which is reflected in declining market shares in world production of minerals. There are still vast areas of the earth, particularly in developing countries, where new deposits are being exposed and together with more favourable economic and geological conditions could compete strongly against local producers. Note should be taken of technological developments and progress made in the rest of the world, when planning for future mining and related development, while every effort should be made to ensure technological progress in mining and treatment of minerals. Furthermore, much more intensive exploration is warranted to counter international competition. Finally, special efforts should be devoted in creating a favourable economic climate in the country to attract much more development capital for this purpose.

In the final section of this chapter it was established that multinational corporation do play an important role in the mining industry of SWA/Namibia. However, the country does not enjoy the full benefits multi-national corporations can bring to a less developed economy. This can be ascribed mainly to the lack of understanding of how to negotiate with multi-national corporations. For this reason many of the typical disadvantages associated with certain practices of multinational corporations are still creating major problems in the development of the mining industry, as was established by the investigations by the Thirion-Commission of Enquiry.

It is important therefore that a study be made of how these undesired practices of multi-national corporations can be eliminated and how multi-national corporations may be employed in the mining sector in order to enjoy the maximum benefits from the mining of minerals in the country. Policy decisions on the conditions of operation of multinational corporations should then be made and included in a comprehensive minerals policy. In the interim it may, however, be necessary for SWA/Namibia to reconsider its existing relations, treaties and agreements if it appears that major problems are experienced with some multi-national corporations due to outdated agreements.

This chapter has assessed the significance of mining in the country's balance of payments and has also established what role the rest of the world and also multi-national corporations play in the performance of the mining industry. One important subject that still requires further attention, is the relation between mining and the government. This and other related issues will be dealt with in the next chapter and particular attention will be devoted to taxation in the mining industry.

CHAPTER ELEVEN

MINING AND THE GOVERNMENT

In chapter eight when the distribution of mining income was dealt with, it was noted that tax paid by mining companies is one of six expenditure items claiming part of the income generated by mining. The consideration of tax issues was, however, carried forward to this chapter so that all matters relating to mining taxation and mining's relation with the government could be examined. This chapter therefore first explores the significance of mining taxation in relation to mining's income and in relation to total taxes paid in SWA/Namibia. The attention then falls on certain policy issues, such as the taxes applying to mining companies, the role of mining in the public finance of SWA/Namibia, and the infrastructure provided by the state to the mining industry. In the final section a brief analysis follows of the mining industry's conduct within this institutional environment created by the state.

11.1 THE SIGNIFICANCE OF MINING TAXATION

In this section taxes paid by the mining industry are analysed from a macro-economic point of view rather than from a public finance point of view. Attention falls on the share of taxation in total mining income. This should not be confused with the taxable revenue of mining companies. Mining's tax propensity is determined in the next section. The marginal tax propensity of the mining industry refers to the ratio of the change in mining taxes to the change in mining income. Finally, mining's tax payments are analysed from the recipient's (i.e. the government's) point of view.

11.1.1 MINING TAXATION AND THE DISTRIBUTION OF MINING INCOME

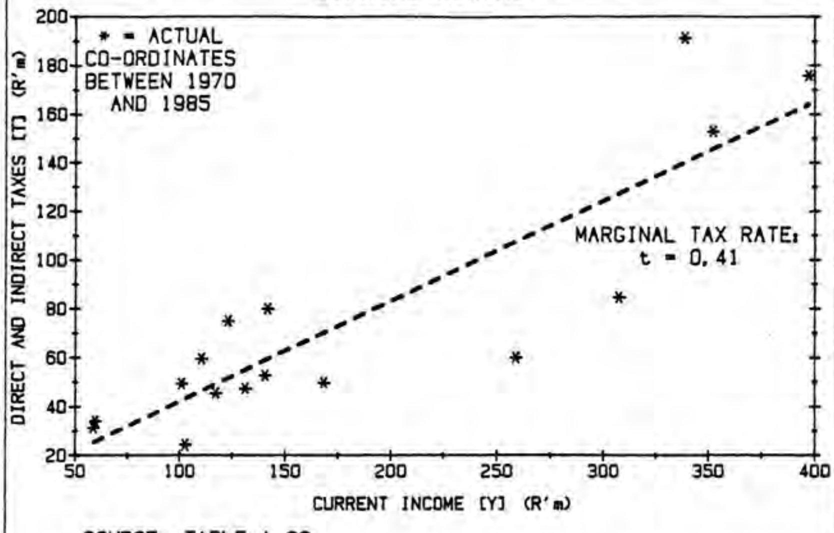
In section 8.3, when the distribution of the operating surplus was discussed, it was mentioned that direct taxes were one of the distinct claimants on the net income of mining companies. It was also pointed out that between 1970 and 1985 these payments ranged between 9 and 51 per cent of mining companies' net income. In this section both direct and indirect taxes are related to mining companies' current income before taxes.

Because the current income in mining is denoted at factor cost in the income and expenditure account, i.e. after accounting for net indirect taxes, it has to be adjusted accordingly to be expressed before the deduction of indirect taxes. Details of mining's current income before taxation on the one hand and direct and indirect taxes on the other hand are given in table A.51 in the statistical appendix for the period 1970 to 1985. This table shows that total tax payments as percentage of current income of diamond mining ranged between 23 per cent in 1977 and 61 per cent in 1974, and the average ratio for the whole period amounted to 42 per cent. The average ratio of tax payments to current income of non-diamond mining companies was 14 per cent, and the percentage ratio varied between 69 per cent (1971) and 2 per cent (1982). It thus becomes evident that the average tax burden of diamond mining in SWA/Namibia is much heavier than it is for the other forms of mining. Several reasons may be cited why the tax ratio in diamond mining is higher than it is in the rest of the mining industry. Firstly, the rate of taxation applying to diamond mines is much higher than that applying to other mining companies (see section 11.2.1). Secondly, an export duty of 10 per cent is levied on the value of diamond export/sales, although no duty of such nature applies to other mining companies. Thirdly, the profit margin for non-diamond mines is generally lower than that for diamond mines and thus renders a lower taxable profit. Fourthly, the lower ratio of taxes paid to income generated by non-diamond mining companies, also arose from the fact that the uranium mine was still enjoying a tax holiday for a large part of the period under discussion. Finally, although all types of mines are allowed to deduct certain capital expenditures from their net profits for tax purposes, the diamond mining industry is generally less capital intensive than the rest of the mining industry, and therefore shows higher average tax ratio's. Capital investment in the uranium mining industry has been extremely high during the mid-'seventies, contributing to the fact that this industry, under a highly favourable tax regime, became liable for tax only during 1983, after being in operation for seven years. Yet, even if the fixed investment in both mining industries is deducted from their respective current income, the diamond mining industry still remains a higher tax payer (at an average ratio of 46 per cent) than the other mining companies (at an average ratio of 22 per cent). "Taxing" the non-diamond mining companies at the average ratio calculated for diamond mines (i.e. at 46 per cent), would yield additional taxes of R288 million for the period 1970 to 1985. The fact that this amount has remained in the mining industry, indicates the highly favourable tax regime pertaining to the non-diamond mining industry.

11.1.2 MARGINAL TAXATION OF MINING

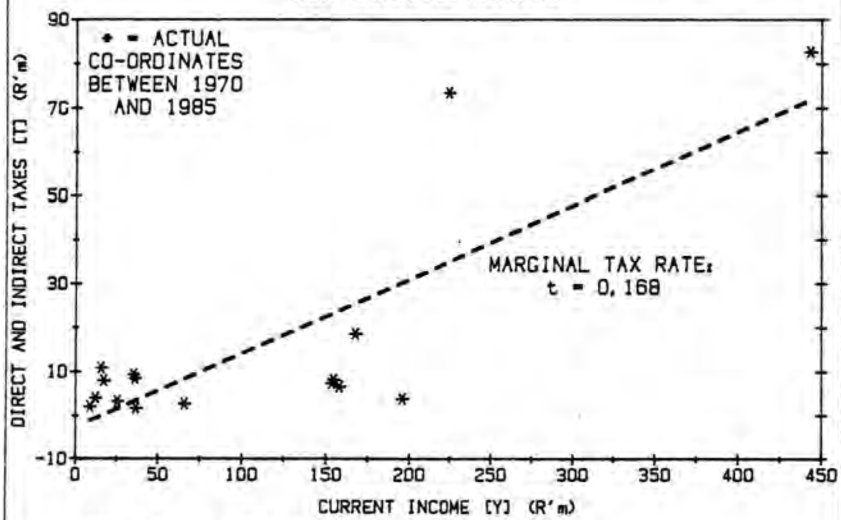
Given the information of the previous section, i.e. the relation between mining income (Y) and mining taxes (T), it is possible to calculate that fraction of taxation (ΔT), arising from a change in pre-tax mining income (ΔY). This fraction is also called the marginal propensity to pay taxes and for purposes of this chapter it is being referred to as the marginal tax ratio or rate. The marginal tax ratio may be calculated for the different mining industries by means of linear regression. To assist in the explanation of the term marginal

FIGURE 11.1 - CURRENT INCOME AND TAXATION IN DIAMOND MINING



SOURCE: TABLE A.66

FIGURE 11.2 - CURRENT INCOME AND TAXATION IN NON-DIAMOND MINING

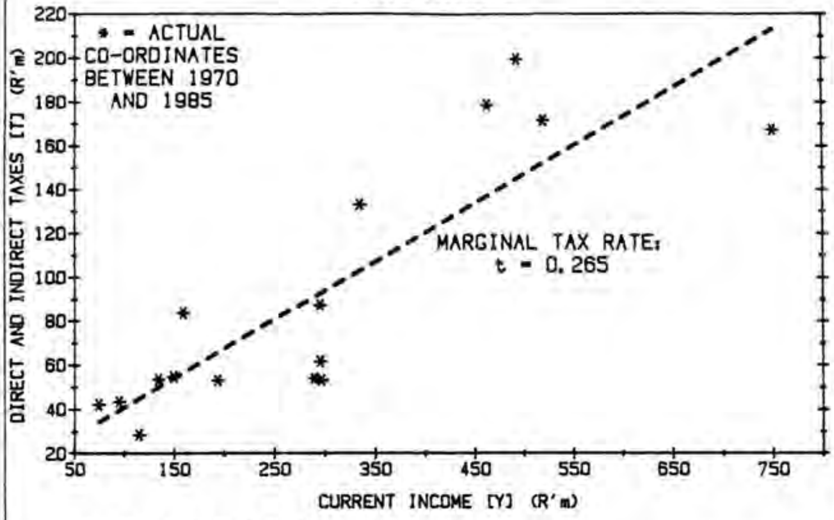


SOURCE: TABLE A.66

tax ratio or rate, figures 11.1, 11.2 and 11.3 are presented to illustrate the relation between income and tax for diamond mining, non-diamond mining and total mining. As before, income in this section is defined as the net operating surplus <u>plus</u> income from property <u>plus</u> (adding back) indirect taxes. The figures show the actual ratio between the two variables as well as the ratio using each industry's marginal rate (t). The function of this ratio is given by the equation T = a + t(Y), where T denotes direct and indirect taxes, Y stands for mining's current income before taxes, a is a constant term, and t denotes the marginal tax rate. The results of the linear regression calculations are set out in table A.66.

Using the data for the period 1970 to 1985, the marginal tax rate for the mining industry as a whole is calculated at 26,5 per cent. This

FIGURE 11.3 - CURRENT INCOME AND TAXATION IN TOTAL MINING



SOURCE: TABLE A.66

means that for every R100 million income generated by the mining industry, almost R27 million is due to the government in the form of direct and indirect taxes. Similarly, the marginal tax rate of diamond mining is calculated at 41,0 per cent and that of non-diamond mining at 16,8 per cent. Figures 11.1 to 11.3 clearly indicate the difference in mining taxation in SWA/Namibia. Whereas diamond mining shows a fairly steep tax curve, the slope of which is represented by the marginal tax rate, the tax curve of non-diamond mining shows only a slight gradient reflecting the lower marginal tax rate.

11.1.3 MINING'S CONTRIBUTION TO TOTAL TAXATION

The mining industry's contribution to total tax payments in SWA/Namibia gives a good indication of the role mining taxation plays in the country's public finance. Table A.60 gives details of the taxes paid by the mining industry and the contributions these taxes make to total taxation in the country. This information is summarised in table 11.1, which gives mining's average, maximum and minimum percentage contribution to direct, indirect and total taxes.

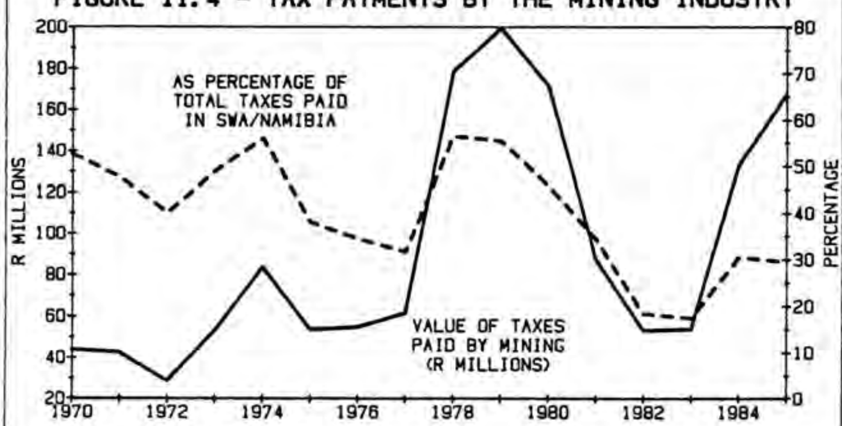
Of total taxes paid in the country between 1970 to 1985, the mining industry contributed on average 37,4 per cent of which diamond mining contributed 31,0 per cent and non-diamond mining 6,4 per cent. The annual share of the mining industry in total taxes is depicted in figure 11.4, from which it appears that the mining industry's share is largely a function of the production trend in mining. The effect of the 1975-recession on the tax payments by mining companies, is clearly visible from this figure. In addition, the recessionary conditions during the 'eighties also resulted in lower tax payments by the mining industry. The increase in mining's tax payments since 1984 was due mainly to increased tax payments by the uranium mine who's tax pay-

TABLE 11.1 - MINING TAXES AS % OF TOTAL TAXES, 1970 - 1985

	AVERAGE (1970-1985)	MINIMUM (YEAR)	MAXIMUM (YEAR)
DIRECT TAXES:			
Diamond mining	38.4%	14.5% (1985)	64.5% (1979)
Non-diamond mining	10.3%	0.2% (1977)	30.8% (1984)
TOTAL MINING	48.7%	18.5% (1983)	67.3% (1979)
INDIRECT TAXES:			
Diamond mining	22.1%	11.1% (1984)	41.2% (1978)
Non-diamond mining	1.7%	1.4% (1978)	2.1% (1983)
TOTAL MINING	23.8%	12.6% (1984)	42.6% (1978)
TOTAL TAXES:			
Diamond mining	31.0%	13.6% (1984)	55.6% (1978)
Non-diamond mining	6.4%	0.9%(1977/78)	16.8% (1984)
TOTAL MINING	37.4%	16.8% (1983)	56.5% (1978)

SOURCE: Table A.60

FIGURE 11.4 - TAX PAYMENTS BY THE MINING INDUSTRY



SOURCE: TABLE A.60

ments commenced during 1983 after a seven year period in which taxes were deferred to allow for the recoupment of capital expenditure.

Mining's contribution to total taxation and hence also to total income of the government, shows large fluctuations, i.e. between 17 and 57 per cent. As a result, the government's revenue from this source is fairly unstable, which is further demonstrated by the fact that between 1970 and 1985 taxes from mining constituted on average about 21 per cent of total current income of the general government, but that this share was at times as high as 49 per cent (1974 and 1979) and recently as low as 6 per cent (1983) (cf. table A.60 and Department of Finance, 1986a: 22). This vulnerable revenue position seriously hampers financial planning and it was also responsible for the partial replacement of revenue from mining with alternative sources such as general sales tax, budgetary assistance from the South African government and foreign loans during the late 'seventies and early 'eighties.

The largest tax contribution by the mining industry is made to direct taxes, mainly in the form of tax on income. This contribution ranges between 19 per cent in 1983 and 67 per cent in 1979 of total direct taxes paid between 1970 and 1985. Direct taxes paid by mining companies amount on average to almost 70 per cent of all company taxes paid (cf. table A.60 and Department of Finance, 1986a: 21-22).

Indirect taxes payable by the mining industry refer inter alia to taxes and duties such as customs and excise duties, general sales tax, prospecting and claim licenses, and most important of all, diamond export duty. More than 90 per cent of the indirect taxes paid by mining comes from the diamond mining industry, principally through the diamond export duty. Indirect taxes from the mining industry as a whole constitute on average about 24 per cent of all indirect taxes paid in SWA/Namibia.

From this analysis it becomes evident that mining, apart from its ability to generate income, also contributes generously to the tax revenue of the government. It was further noted that the main contribution to taxes comes from diamond mining, whereas the non-diamond mining industry's tax contribution is small, owing to the favourable tax system applicable to these mining operations. Finally, it was noted that the mining industry was at times the most important single contributor to taxes and therefore to government income, but that this source became a much smaller, unstable and unreliable source of state revenue, partially causing the subsequent financial problems in public finance.

11.2 GOVERNMENT'S POLICY TOWARDS MINING

During July 1985 the government's policy on mining and on the mining industry in SWA/Namibia was spelled out in the "Draft National Development Strategy for South West Africa" (Directorate of Development Co-ordination, 1985b: chapter 6, pp. 6-7). Its policy guidelines could be summarised as follows:

- # Mineral exploration and exploitation should be carried out by the private sector without competition by the government;
- # Government should exercise control over ecology, speculation and ineffective mining methods;
- # Mineral exports should be monitored;
- # No racial discrimination should be practiced when granting prospecting and mining rights;
- # Opportunity should be afforded to nationals to invest in the mining industry;
- # Conditions to obtain mining rights should be designed in such a way that it encourages mining;

- # Marketing, technical and financial aid should be given to small-scale mining;
- # Information of importance to the mining industry should be given to potential investors; and
- # Mines running losses should not be subsidised, except in unforeseen circumstances.

The fact that the government has committed itself to a definite policy is a commendable step, but it appears that the proposed policy guidelines are merely ad hoc responses to problems and conflicts currently encountered. The proposed strategy immediately rules out any state participation in exploration, mining or marketing and leaves the development of the country's mineral resources entirely in the hands of private companies. The government, however, did not seem to have taken this suggestion seriously, because it recently acquired all the voting shares in Rössing Uranium Limited and intends acquiring further commercial shares from the company in future (SWA/Namibia Information Service, 1985: 8). This contradiction in the official policy clearly illustrates the apathetic nature of the government's approach towards its mineral resources. Be it as it may, it was pointed out in chapter one that state shareholding in private mining companies does not guarantee development in the mining industry; more direct state involvement is necessary to step up the development. In addition, the draft development strategy does not deal with the important subject of taxation of mineral resource projects and how this could be used to encourage the extent of exploration and mining development and discourage undesirable mining practices. Furthermore, the development strategy looks at mining entirely in isolation and does not link the proposed development in this sector with that of other industrial sectors in an attempt to establish forward and backward linkages.

On the whole, it seems therefore that this half-hearted attempt to establish a minerals policy for the country is not dynamic enough to employ the country's mineral resources to provide the nucleus for economic and industrial development.

11.2.1 TAXES APPLYING TO MINING COMPANIES

The government's policy towards the exploitation of minerals is to a large extent also embodied in the tax structure applying to the mining industry. For this reason it is essential to look at the taxes currently pertaining to the mining industry in SWA/Namibia.

Taxes applying to non-incorporated mining enterprises are the same as for personal taxes. Income from different sources (interest, dividends, profits from the mining concern, etc.) are added together to arrive at the taxable income. Deductions from mining profits allowed for tax purposes are the same for non-incorporated mining enterprises as for mining companies. The choice between establishing a mining company or a non-incorporated mining enterprise, depends mainly on the size of the profit from mining, since the rate applying to non-incorporated enterprises is progressive to a maximum marginal rate of 42,5 per cent (1985), whereas the tax rate applying to mining companies (except for gold and uranium mining) is a flat rate.

The taxes applying to the diamond mining are first the normal diamond mining company tax at a rate of 55 per cent (1985) of the taxable profit, after allowing for certain deduction items. In certain specified mining areas a diamond producer is liable to pay an additional tax, referred to as the diamond profit tax, amounting to 15 per cent (1985) of the taxable profit on the proceeds of diamonds won or found by him. The diamond profit tax is, however, deductible from the normal company tax payable, which means that the latter tax is only of theoretical importance, since the effective rate of both these taxes remains 55 per cent. Furthermore, all diamonds exported from SWA/Namibia by the Diamond Board are subject to the diamond export duty of 10 per cent (1985) of the proceeds of the sale of such diamonds and is payable by the purchaser to the Diamond Board at the time of delivery of the diamonds to him by the Board (Kritzinger, 1982: 62). This tax is strictly speaking assessed on the purchaser and not on the seller, but the present practice is to calculate the duty as a charge against the proceeds of the seller. Another peculiarity of the tax system applying to the diamond mining company, CDM, is the fact that 22,5 per cent of the proceeds of the diamond export duty and the diamond profit tax is refunded to the company, South West Finance Corporation, as a "royalty". This tax practice dates back to the German rule and is intended to be a "refund" for the right to assess taxes on producers within certain areas. This is so, because the South West Finance Corporation acquired the land right to these areas from German companies, who in turn are said to have bought these areas from inhabitants before any government was instituted in the territory. Between 1950 and 1985 the royalty payments to South West Finance Corporation amounted to R168 million (Auditor-General's reports 1949/50 to 1983/84; Department of Finance, 1986a: 28)

Income from uranium mining operations generally is taxed in the same way as gold mining income. The normal tax rate on income from gold mining operations is based on a formula that provides for a variation in the rate in accordance with the ratio of taxable income to gross revenue derived from such operations (Kritzinger, 1982: 19). The precise formula applying to the present uranium mine in SWA/Namibia is, however, not general knowledge. Income from other mining operations is assessed at a rate of 42 per cent (1985).

Income not related to mining operations, such as interest on investments, is taxed at non-mining company tax rates, currently at 40 per cent (1985). Non-residents receiving dividends from local mining operations are liable to pay a 15 per cent (1985) non-resident shareholders tax. Strictly speaking this tax is not assessed on local mining companies as such, but rather on the dividend earnings of foreign shareholders. (Accordingly, in national accounting the non-resident shareholders tax is classified neither as a direct nor as an indirect tax, but as a transfer received by the general government from the rest of the world.) The effective rate for non-resident shareholders tax is usually lower than 15 per cent, because mining companies are allowed to adjust the statutory tax rate according to the ratio between the net profit derived from purely domestic sources and the total net profit. This measure had the result that foreign owned mining companies invest most of their surplus funds outside the country in order to lower the income derived from domestic sources and thereby lowering the effective non-resident shareholders tax rate. This is one, if not the most important reason, why mining companies conduct most of their bank business outside the country, a practice which seriously retards the development of a local money and capital market, as was pointed out in section 9.4.

Table 11.2 gives details of the statutory tax rates applying to the mining industry during 1961 and 1985. The table shows that the rates have only been increased marginally during the period under review, except for diamond profits tax and diamond export duty, the rates of which have remained unchanged. However, it must be mentioned that the statutory tax rates per se are not a true reflection of the actual tax contribution in relation to the income generated by a mining company,

TABLE 11.2 - MINE TAXATION - 1961 AND 1985

TYPE OF TAX	DIAMOND MINING		URANIUM MINING		OTHER MINING	
	1961	1985	1961	1985	1961	1985
Mining company tax ...	45.0% a\	55.0%	d\	d\	30.0% a\	42.0%
Diamond profits tax ..	15.0% b\	15.0% b\	n/a	n/a	n/a	n/a
Export duty	10.0%	10.0%	-	-	-	-
Non-resident share-holder's tax	10.0% c\	15.0%	10.0% c\	15.0%	10.0% c\	15.0%

NOTES: n/a = not applicable.

a\ Applicable to taxable income exceeding R1 million, otherwise a lower tax rate applies.

b\ Deductible from calculated normal company tax payable.

c\ Applicable only to shareholders resident outside the rand monetary area;

d\ Tax is similar to the formula applicable to gold mines, (cf. Kritzinger [1982: 84-85]), but no particulars are made available.

SOURCES: Department of Economic Affairs (1962: 14), Kritzinger (1984) and SWA/Namibia Information Service (1984: 13-14).

because mining companies may manipulate their effective tax rate by using formal and informal tax concessions whereby mining companies are allowed to deduct certain capital expenditures from current and future taxable income. The average and marginal propensity to pay taxes presented in sections 11.1.1 and 11.1.2 are therefore more reliable indicators of mining income distributed to the government.

The principal deficiency in the present tax regime does not lie in the tax rates per se, but rather in the erosion of the income tax base of mining resulting from over-generous tax concessions. To ensure that mining companies make a fair share to taxation in the country, the nature and extent of "capital expenditure" should be reassessed to include only those investments which truely lead to increased mineral production. In addition, the introduction of indirect taxation in the form of royalties, export or sales duties should be considered seriously. An export duty is already applicable to the diamond mining industry and although the industry is fighting for the abolition of the duty, it is a great success. Not only does it provide a continuous cash-flow for the government, but it also ensures more direct control over mineral exports. In addition, the rate at which the duty is levied can be differentiated to induce the local beneficiation of minerals.

11.2.2 MINING'S IMPACT ON PUBLIC FINANCE

In this section the attention falls on mining's role in the public finance of SWA/Namibia. Unfortunately, no data is available for taxes paid by the non-diamond mining industry for the period 1949/50 to 1968/69. However, these taxes represented only a negligible portion of total revenue and should not distort the picture of mining's contribution to the central government revenue significantly.

Table A.50 in the statistical appendix gives details of the amount of taxes paid by mining and its share in total central government revenue. From this analysis it appears that during the 'fifties and 'sixties mining taxes represented a fairly stable source of revenue, contributing on average 34 and 39 per cent to total central government revenue during the two periods mentioned. The stability of this source of government revenue is illustrated by the fact that its share ranged between 21 per cent in 1950 and 43 per cent in 1963.

The position, however, began to change drastically since the 'seventies. At first government revenue from mining began to increase dramatically, owing not only to the large tax contributions by the diamond mining industry, which had reached its peak production and had also experienced sharp increases in diamond prices, but owing also to relatively high taxes paid by the non-diamond mining industry. The average contribution to central government revenue during the period

1970 to 1979 then stood at 52 per cent. The deviation from this average, however, was beginning to increase. At that stage it would have been very timely for the government to pursue a more conservational policy on the exploitation of the country's mineral resources by insisting on lower production levels, thus ensuring a lower but more stable tax contribution particularly from the diamond mining industry. The government instead accepted the then increasing tax contribution by the mining industry willingly, committing itself to growing levels of government expenditure from which it could not return in later years when the revenue from mining did not match those amounts which prevailed during the prosperous years.

The large decline in government revenue from mining since 1980 has been mainly the result of the recession in the diamond mining industry, which was reflected in declining diamond prices and drastically reduced sales. The contribution by mining to the revenue of the central government decreased from 58 per cent in 1979/80 to 7 per cent in 1982/83 - a decrease in the tax contribution of more than 50 per cent. During this period the expenditure of the central government began to increase, owing to services which had to be taken over from government institutions in South Africa and owing to the fact that the previous high levels of revenue had brought about a mentality within government departments, that services might continue on the scale and standard which prevailed during the late 'seventies and early 'eighties. These developments together with the fact that the central government was now obliged to find its own finance for its shortfalls, lead to serious public finance problems in SWA/Namibia. Still not able to bring down the scale of public services, financial aid from South Africa and foreign loans were used to overcome these shortfalls, which grew to tremendous proportions for the first time in the history of public finance in the country. [See Jones (1984: 10-11) for a more detailed account of recent public finance problems in SWA/Namibia.] The deficit before borrowing and before accounting for budgetary assistance amounted to 26 per cent of the GDP during 1985/86 and the external debt-to-GNP ratio stood at 34 per cent during 1985. High external debt-to-GNP ratios are typical for mineral based economies and Nankani (1980: 9) ascribes this to the unstable export earnings of these economies. He also cites the fact that much of the debt is appropriated for consumption purposes as another important reason for the poor debt position of mineral based economies.

It is clear from the discussion above that the government has become entirely over-dependent on the public revenue generated by the mining industry and that severe public finance problems developed when the taxes from the diamond mining industry began to slump. It is important therefore to briefly deal with some of the circumstances that have contributed to this situation.

Firstly, one serious shortcoming in the financial set-up during the period 1969 to 1979 (the so-called period of rearrangement) was that central government revenue and expenditure was channelled through the SWA-Account, a sub-account of the State Revenue Fund of South Africa. The budgets of the SWA-Account were mostly planned, drawn up and executed by public servants, locally and in South Africa, with very little input from local political, community and business leaders. No questions were asked and no suggestions made about the public financial matters. On the other hand, owing to the buoyancy of the economy and the healthy public finance position at that stage, nobody cast any doubt on the prevailing fiscal set-up.

Secondly, because of the overwhelming importance of diamond taxation, investigations into the tax regime of mining and that of the non-diamond mining industry in particular were continuously neglected. No attempt was made to establish a reserve fund in which surplus revenue from the relatively high taxes could have been deposited to finance mining related projects, such as prospecting and exploration, or to serve as a contingency fund for appropriation in later years.

Thirdly, until recently no attempt has been made to establish whether the taxes paid by mining were in fact a true representation of the real income generated and earned by the mining industry. It is therefore not surprising that the Thirion-Commission who has been investigating this, came across some serious defects in the country's control over its mineral resources which has directly led to the alleged offences such as overmining, transfer pricing of mineral exports and a reluctance to develop payable deposits.

Fourthly, after the public revenue began to slump seriously during 1981, partly resulting from the recession in the diamond mining industry, the South African government was quick to come to the rescue of the local treasury. As percentage of total revenue of the central government the contributions made by the South African government have grown from 11 per cent in 1975/76 to 27 per cent in 1985/86 (Department of Finance, 1986a: 28). Although these contributions partially solved the public finance problems, they contributed to the further neglect of efforts to become more self-sufficient as far as public revenues are concerned.

Finally, planned or estimated government revenue from mining usually does not correspond with the actual income tax receipts from mining. Table A.49 in the statistical appendix illustrates the deviation of actual revenue from the budgeted revenue from mining and it appears that over-estimations of as high as 50 per cent and underestimations of as high as 42 per cent were not uncommon during the past 17 financial years. This clearly illustrates that the government is not as informed as it should be about the developments in the local mining industry and about the conditions on the international mineral markets. Because public expenditures are based inter alia on expected revenue and these in turn fluctuate wildly owing to the inconsistency of mining taxes, the government's fiscal programme is essentially of a short-term and ad hoc nature. This is illustrated by the fact that the central government began relying heavily on cuts in capital expenditure rather than in current expenditure, when attempts were made to exercise "financial discipline" during years when the revenue from mining was beyond expectations.

The factors described above therefore suggest that the government took an overly optimistic view of the prospective price and life-span of crucial minerals, which directly and indirectly contributed to the present public finance problems in SWA/Namibia. Since mineral sources are finite, it should be an accepted tenet of economic policy that revenues from their exploitation should be used to promote other economic activities so that public revenue, foreign earnings, employment and demand will not slump seriously when the mineral deposits are exhausted or if the demand for the mineral falls (Leistner, 1981: 82). In addition, the efforts made by the Thirion-Commission, to question the existing policy of the government towards mining and certain practices of mining companies, should be welcomed and encouraged by the government despite the embarrassment and criticism this may cause. It is also imperative to embark on long-term fiscal planning in order to assess the mining industry's future public revenue generating potential and to determine alternative revenue sources which will ultimately replace revenue from mining. This planning should also involve the appropriation of funds on projects in an endeavour to diversify the economy and broaden the tax base. It is inevitable that the government will have to play a much greater role in these developments than ever before and in lieu of private investment it is quite possible that the traditional roles of the private and the public sectors will gradually change.

From table A.50 it may be noted that there has been a slight improvement in mining taxation since 1983/84. This improvement in taxation may be ascribed mainly to the commencement of income taxes paid by the uranium mine after a tax holiday of seven years. During 1984/85 the uranium mining industry became the single largest contributor to the tax proceeds of the central government. But as was mentioned in the previous chapter, this source of government revenue is only secured in the long-term if favourable terms of delivery are forthcoming. The government should not therefore accept that the tax inflows from the uranium mining industry are of a permanent nature and adjust its spending pattern accordingly, but, seen that the revenue from this source is highly susceptible to extraneous forces, it should consider establishing a contingency fund in which part of the tax proceeds from the uranium mining industry, which are expected to remain on a relatively high level for some years to come, are deposited and appropriated for purposes of mining and mining related developments.

11.2.3 GOVERNMENT'S EXPENDITURE ON THE INFRASTRUCTURE OF THE MINING INDUSTRY

In this section a brief discussion follows of the role government plays in the infrastructure which serves the mining industry. Although many forms of public spending serve the mining industry, e.g. road and rail links, water and electricity supply, and post and telecommunication services, not all of these expenditures can be distinguished by type of sector.

The government's present policy on the provision of services to the mining industry is not very clear. On the one hand large sums are spent providing the infrastructure for certain mines which have limited potential or lifespans, while on the other hand some mines are obliged to acquire and provide their own infrastructural services, such as water supply and other general municipal services. The latter is the case at the mining town of Oranjemund.

With this lack of policy in mind, a short analysis follows of two central government departments' expenditure on infrastructural services to the mining industry. Table 11.3 gives details of the capital expenditure incurred by the Departments of Transport and of Water Affairs, classified by the different mines where the services were rendered. These services were rendered exclusively to non-diamond mines and the total value amounted to R12,3 million between the financial years 1978/79 and 1982/83. Although this amount is just covered by the tax receipts of the government from the non-diamond mines, this is not the case with some individual mines. Table 11.3 is self-explanatory.

It is clear that the government should pursue a more definite policy regarding the responsibility for the provision of the basic infrastructure to and around the mining site in order to increase the government's leverage and share of the benefits flowing from the mining venture and to prevent a too large tax loss being incurred if a mine provides its own infrastructure. It is also necessary to calibrate the public infrastructural programmes according to the regional mineral potential, thereby bringing the infrastructure to areas with mineral potential. This requires careful and integrated development planning and it is essential that the government has all the relevant geological and mineral resource data at its disposal.

TABLE 11.3 - CAPITAL EXPENDITURE INCURRED BY THE DEPARTMENTS OF TRANSPORT AND OF WATER AFFAIRS FOR THE INFRASTRUCTURE PROVIDED TO THE MINING INDUSTRY FOR THE PERIOD 1978/79 TO 1982/83 - R ' 000

MINE	LOCATION OF MINE	DEPARTMENT OF		TOTAL EXPEN- DITURE
		TRANS- PORT	WATER AFFAIRS	
RÖSSING	SWAKOPMUND	2,038	6,788	8,826
ROSH PRINAH	LÜDERITZ	667	-	667
KLEIN-AUB	REHOBOTH	348	-	348
MATCHLESS	WINDHOEK	45	-	45
UIS	DAMARALAND	1,354	355	1,709
SWA-LITHIUM	KARIBIB	58	-	58
COASTAL SALT PANS	SWAKOPMUND	528	-	528
TSUMEB	TSUMEB	100	-	100
TOTAL		5,138	7,143	12,281

SOURCE: Correspondence with the respective departments.

11.3 MINING'S APPROACH TOWARDS THE GOVERNMENT

The mining sector's approach towards the government is a consequence of the government's policy, or rather lack of policy, towards the mining industry. This section looks at the mining industry's conduct within the institutional environment created by the state, with special reference to certain undesirable practices. In chapter three it was already mentioned how land-locking and the discouragement of further processing of raw materials has forfeited certain proposed developments. In the previous chapter it was illustrated that the state is still deprived of valuable information about the country's mineral potential. This section deals with certain deficiencies in the present tax system and with ways in which some tax measures may be manipulated.

At the outset, it may be accepted that mining companies still regard taxes as normal operating expenditure, that should be avoided wherever possible and by all means available.

The first practice stems from the fact that mining and non-mining income are taxed separately and at different rates in SWA/Namibia. Because non-mining income is taxed at a lower rate than mining income, mining companies may seek to increase non-mining income as far as possible by transferring income from mining operations to non-mining concerns. Non-mining enterprises take the form of holding, investment and prospecting companies. Property and mining grant holding companies rent grant areas to the parent company in exchange for royalties and others serve as secretarial concerns which handle secretarial or property renting services for the patent company against payment.

Transfers of this nature are all legitimate as far as could be established, but they tend to siphon off mining income and thereby seriously erode the tax base of the mining industry. In a similar way the tax base of non-resident shareholders tax is eroded by allowing differentiation between domestic and foreign income (cf. section 11.2.1).

Another way in which mining companies can avoid taxes legitimately is through take-overs of existing mines. The purchase price of such transactions is still regarded as ordinary "capital expenditure" and may qualify for deduction from future profits of the parent company. Usually the mine that is taken over has a lower profitability than the parent company. Take-overs of this nature usually result in significant tax losses for the parent company and may take some years to be worked off before the company will again be liable for taxation. Under certain circumstances take-overs of mines may have the effect that capital expenditures are in fact written off twice against mining profits. This over-generous tax treatment of capital expenditure does not only lead to excessive capital intensity of mining operations, but also distracts capital from other non-mining business ventures (Lecomber, 1979: 105).

Similar practices also occurred in South Africa, but take-overs under such circumstances were disallowed recently. In South Africa take-overs of mines may still take place, provided that the acquired mine is treated as a separate company and will not affect the existing company's profit in any meaningful way. A similar treatment of mining take-overs and speculation in mining grants may be considered in SWA/Namibia or alternatively, a capital gains tax could be applied to the seller or the purchase price of a mine or grant could be disqualified for immediate depreciation.

Because the purchase price of certain prescribed assets becomes deductible from mining companies' taxable income, the extent and definitions of these assets is another possibility for tax avoidance. Many mining companies in SWA/Namibia are currently not liable for tax owing to capital expenditure incurred earlier, which is a tax concession not often appreciated by the mining industry. This tax allowance, however, may easily deteriorate into a practice whereby mining companies under certain circumstances may opt out of paying the taxes due, through the acquisition of capital goods to the value of the anticipated future tax liability. Under a continual and sometimes superfluous capital expenditure programme, the tax liability can be deferred indefinitely (Musgrave & Musgrave, 1980: 437). Although it is difficult to achieve, an attempt should be made to let only those capital expenditures qualify for immediate write-off from taxable income, that truely expand the mining capacity and which in fact lead to increased mineral production.

11.4 CONCLUSION

This chapter made an investigation of the relationship between mining and the government with specific reference to the significance of mining taxation and related policy issues.

It was established that over the period 1970 to 1985 mining distributed on average 31 per cent of its total current income to the government in the form of direct and indirect taxes. The ratio between income and tax was estimated to have a marginal rate of 26,5 per cent. The average share of current income distributed to the government by means of taxes amounted to 42 per cent for diamond mines and to 14 per cent for non-diamond mines. This indicates that the tax system for non-diamond mines is much more favourable than that of diamond mines, which can be ascribed to inter alia the high statutory tax rates applying to diamond mining.

Of total taxes paid in SWA/Namibia, mining contributed on average about 37 per cent. This contribution, however, fluctuated fairly widely - between 57 per cent in 1978 and 17 per cent in 1983. This situation obviously contributed indirectly to the current public finance problems, since the mining industry which once was the most important contributor to taxes, became a much smaller, unstable and unreliable source of state revenue. In examining this situation in more detail, it was established that the government took an overly optimistic view of the prospective price and lifespan of crucial minerals and did not adjust its spending programme accordingly, nor did it redirect the revenue from mining into alternative income generating projects.

A critical assessment was made of the government's minerals policy and the mining tax regime and the conclusion was reached that the existing minerals policy of the government is inadequate to deal with certain undesirable mining practices. In addition, the present tax regime applicable to the mining industry has some serious deficiencies. The tax system has not changed meaningfully over the past six decades and is in fact a mere copy of the South African tax system. These shortcomings in the tax system are reflected in the wide deviation between the actual revenue generated by the mining industry and its corresponding tax contribution.

Furthermore, the tax system which lends itself to tax manipulation practices will inevitably require certain tax reforms, which should involve a reassessment of the income tax base to get a more appropriate definition and tax assessment of the mineral rent of the industry. Because of the administrative ease of indirect taxation and its characteristic to counter tax manipulation, there should be a greater leaning towards taxes like royalties, export or sales duties. Finally, the fact that mineral resources are depletable, implies that mining does not represent a permanent source of government revenue; it must be SWA/Namibia's primary aim to diversify its economy and broaden its tax base, as it is to be expected that some mineral resources are being drawn down gradually and others rather abruptly.

CHAPTER TWELVE

CONCLUDING REVIEW

This study has basically embraced the substantiation of statistical facts to determine the economic significance of the exploitation of mineral resources in SWA/Namibia. Using the national accounts of SWA/Namibia as a premise and extending these through further analyses based on accepted statistical techniques, it was possible to obtain an objective view on the mining industry's impact on, and its significance to, the economy. The empirical investigation as well as certain theoretical considerations made it feasible to determine the benefits, as well as the accompanying drawbacks, resulting from the exploitation of the country's mineral resources. This in turn laid the foundation for reaching certain conclusions and for making certain suggestions regarding the management of the country's mineral resources. The study was structured in such a way, so as to assess mining's impact on the economy as a whole and to determine the long-term trends of mining's activities.

12.1 THE MAIN CONCLUSIONS OF THE STUDY

After having surveyed all the important factors of mining in SWA/Namibia, the overall conclusion to be reached, is that mining does have an important, yet cyclic impact on the economy as a whole and on particular macro-economic dimensions of the economy - such as production, investment, employment, taxation and the financial flows in the economy. From the investigations it is evident that the mining industry is largely influenced by extraneous economic and technological forces and lately also by political considerations. The non-mining sectors of the economy, who are not closely linked to mining, but which indirectly rely heavily on the well-being of the industry, are also affected by these cyclic trends, causing some instability throughout the country's economy.

Having analysed the long-term trend of mining's activities in the economy, there emerges a distinct characteristic in all socio-economic fields investigated. This manifestation refers to the apparent existence of two well-defined cycles which stand in total opposition to each other. The first cycle stretches from 1950 to about 1977 and the second refers to the post-1977 period. The mid-'seventies therefore represent a kind of watershed between two distinct eras of mining in SWA/Namibia. The first era is characterised by the fast development and exploitation of the country's mineral resources, while the latter era, which may be seen as the consequence of the first era, is typified by declining production, disinvestment, lack of development and decreasing employment and income generation. Thus, entirely different circumstances began to set in particularly after 1980, that changed the direction of the mining industry and also changed the industry's impact on the economy.

The existence of these two cycles, which reflects the typical trend of a Gompertz-function, conforms with one of the various scenarios presented in chapter one, viz. "that the resources would be used up quickly in a period of rapid growth and high living, followed by a collapse of the system because of the essential nature of the resources" (Howe, 1979: 82). Whether this scenario is a true reflection of how the country's mineral resources were managed, depends entirely on what future course of action the government may take to reverse the current deterioration of the mining industry. In this respect the question of what role mineral resources should play in economic development again becomes critical. These issues were dealt with in chapter one and it was concluded that substantial benefits may accrue to a country from its mining industry, provided that an appropriate minerals policy exists and is adhered to. Good endowment in mineral resources does not necessarily guarantee development and prosperity. The use of mineral resources as vehicle for economic advancement requires careful planning and effective management of the proceeds from the sale of resources. Mineral resources are ideally suited to affect regional development and to provide linkages between mining and the rest of the economy. However, relying too heavily on the mining sector for the provision of employment, foreign exchange earnings and fiscal revenue can bring about greater development problems once the mineral resources become exhausted. A coherent and responsible natural resources policy therefore becomes imperative when employing a country's natural resources in the economic development process.

In the analytical part of the study the impact which mining makes on different macro-economic aggregates were investigated, and in this process it soon became apparent that the country's mineral resources were not effectively employed in the economic development process, and that the advantages of a rich mineral resource endowment were never realised. This, as well as the recent deterioration of the mining industry can mainly be ascribed to the lack of a definite economic development policy in general, and in particular, the lack of a clear policy concerning the direction and mode of development of the country's mineral resources. SWA/Namibia's mineral resources have certainly resulted in economic growth and an acceleration of socio-economic development. But, in the absence of a clearly defined minerals policy, this development was often a by-product of the exploitation of these resources, rather than its main objective.

These aspects need further attention and the intention is to conclude this study with a few suggestions on a future minerals policy for SWA/Namibia. But, before attention can be focused in that direction, it is necessary to set the scene by summarising the main findings of the analytical part of the study, followed by an account of the policy implications of some of the macro-economic trends. The main emphasis is on more recent trends in order to assist in the identifying of the turning point of the two cycles mentioned above.

12.2 IDENTIFICATION OF MACRO-ECONOMIC TRENDS

This section is intended to summarise the main findings of the analytical part of the study. Attention is given to the fundamental potency of the mining industry in the economy and how this can be used to strengthen the overall economy. The typical development problems which originate from a large but vulnerable mining industry are also highlighted.

In chapter two attention was focused on the physical, geographical and historical aspects of the mineral industry. 92 different mineral groups or species are mined and/or found in SWA/Namibia, but despite this vast diversity of the mineral occurrences, some of which are of strategic importance in industrial production processes, only a few minerals have been, and continue to be, mined economically and uninterruptedly. It is important that the question of the country's remaining ore reserves be approached with scientific accuracy based on sound economic and geological principles.

The geographical distribution of mineral occurrences in SWA/Namibia is of such a nature that it can form a sound basis for regional development. To affect regional development based on the mineral potential, careful and integrated research is needed to relate the development of the mining industry with <u>inter alia</u> the industrial, infrastructural, manpower training and fiscal requirements of the country as a whole.

The turning point in the two eras of mineral exploitation in SWA/Namibia and the similarity with the Gompertz-function clearly shows up in the <u>long-term</u> trend in the physical volume of mineral production. The average growth in mining production during the period 1950 to 1977 amounted to 6,9 per cent per annum, while the physical production during the period after 1977 declined at an average annual rate of 3,6 per cent. When examining the different components of mineral production, it becomes clear that the gradual decline in the overall level of production was mainly the result of a sharp decrease in the production of diamonds - the annual diamond production decreased from more than two million carats in 1977 to less than one million carats in 1985. In addition, the quality of diamonds produced (as measured by the average weight per stone recovered) declined from about 0,8 carat during the mid-'seventies to about half a carat during the 'eighties. The recessionary conditions in the international diamond market in recent years surely had an adverse influence on the production of diamonds, but the hypothesis that diamonds were selectively overmined during the 'seventies, an allegation on which the Thirion-Commission heard startling evidence, remains to be proven wrong.

Fortunately the non-diamond mining industry did not experience a similar set-back, which proved to be an important stabilising factor for the economy. Uranium mining, which became the largest contributor to the GDP and to exports during the early 'eighties, therefore played a major role in partially absorbing the economic shock resulting from the severe slump in the diamond mining industry.

Chapter two has thus shown that the development of new mining ventures has virtually come to a stand still in spite of the good mineral potential. This is primarily a reflection of the country's poor political outlook. The lack of a definite mineral development plan and the fact that no significant actions were and are taken to promote mining development, have also contributed to this stagnation. It also became apparent that the life-span of diamond mining in SWA/Namibia has been shortened through a lack of definite policy measures, such as production quotas which take into account the life-span of the mining area, and domestic and international economic conditions. Finally, it was illustrated that it was possible for one mining venture to develop into the country's single largest income generator and exporter, all within a period of ten years. This fact proves that the future should be approached in a pragmatic way and that it is inappropriate to become pessimistic about recent adverse developments.

Having dealt with the physical production trends in mining, chapter three continued with an analysis of the value of mineral production and what impact this has on the economy as a whole.

From 1950 to 1985 mining was the largest contributor to the GDP, but this contribution slowly declined from an average of 39 per cent in the 'fifties to an average of 32 per cent during the 'eighties. Apart from this declining trend, mining's contribution to the GDP has, since 1970, begun to fluctuate more strongly, when the contribution began to range from an all time low of 25 per cent in 1971 to an all time high of 47 per cent in 1978. Thereafter a sharp drop in mining's share in the GDP was recorded. The decline and fluctuations of the value added by mining obviously had a marked influence on other dimensions of the economy as well. Between 1978 and 1985 employment in mining decreased from 19 200 to 14 900 workers, real fixed investment in mining decreased from R64 million to R9 million and mining's contribution to total taxation decreased from 57 to 29 per cent.

Owing to the spelling high rate of inflation during the 'seventies, it was absolutely essential to deflate financial data by means of various "price deflators". This analysis led to the conclusion that different deflating techniques produce different results for real value added in mining, depending on the assumptions made about input and output price data in mining and about the relation between mining's real inputs and outputs. It was observed that the percentage contribution of mining to the GDP at constant prices is much more stable than at current prices, and supports the view that fluctuations in the income generated by mining reflect unstable prices rather than unstable production.

An important subject of the investigation into mining's production trends was to determine the existing linkages of mining with the other productive sectors of the economy. These relationships were quantified by using estimates of an input-output table, especially drawn up for this purpose. Owing to the low level of industrial sophistication in SWA/Namibia, only an insignificant fraction of mining's output is used in the local manufacturing sector, which in turn restricts the functioning of the forward multiplier. The export market still remains the mainstay of the local mining industry and the income generated by mining in the economy was made possible mainly through mineral exports. The backward multiplier on the other hand, although also restricted by the extremely low local content of inputs in the mining industry, holds some economic significance. For every R100 million increase in the mineral outputs, R84,6 million is added to the domestic product, of which R11,5 million or 13,6 per cent ensues from production in sectors other than mining. Applying these ratios to the actual economic aggregates, it appears that, apart from mining's direct contribution to the GDP, amounting on average to 33 per cent from 1970 to 1985, the average indirect contribution by the non-mining sectors in the economy resulting from mining's acquisition of current outlays, amounts to about 5 per cent of the GDP during the same period. However, this backward linkage of mining could be used far more efficiently, if the country's exceptionally high import dependence could be reduced through fostering import replacing industries, if economically sound.

Because the country is still heavily dependent on minerals for income generation and export earnings, a collapse of the country's mineral resources, or even a major decline in mineral production would result in a severe shock and cause irreparable damage to the economy. This was illustrated by a simulation exercise in which both the direct and indirect effects of a possible halving of the diamond and uranium output were taken into consideration. In order to decrease the country's excessive dependence on a few strategic mining industries, to provide linkages between mining and secondary industries and to exploit those minerals which at present are under-exploited or not mined at all, a number of suggestions were made regarding possible projects associated with the mining industry. The mining industry's pivotal role as a catalyst for economic development can be extended far beyond what is the case at present, provided that certain policy reforms are introduced and certain structural problems in the economy are eliminated.

Apart from the large-scale exploitation of minerals with which SWA/ Namibia is adequately endowed to warrant further development, considerable advantages may also be gained by the mining and treatment of mineral products which are at present still being imported, or by the forward and backward integration of mineral outputs and inputs into the manufacturing sector. Other modes of mining could be established in the country by either encouraging small-scale mines in areas where the deposits are best suited for this kind of ore extraction, or by co-ordinating or consolidating certain deposits into well established marginal mining projects to ensure continuity in employment, production and in capacity utilisation. The initiation of these projects is becoming an urgent necessity and may be economically feasible in a macro-economic sense, seeing that the larger mining projects are nearing the end of their lifetime. These projects can, however, only be successfully developed into viable industries with a positive minerals policy providing for proper integration of such projects into an industrial development plan or strategy.

Chapter four investigated capital formation in the mining industry, its relation to total capital formation in the country, employment in mining, the output of the mining industry and the output of industries producing capital goods for the mining industry. From 1950 to about the early 'seventies the capital stock in mining rose only marginally and was in fact declining as a percentage of the total capital stock employed in the country as a whole. But, with the large expansion of the mining industry during the 'seventies it began to increase rapidly and so did its share in the total capital stock. However, since the early 'eighties, the capital stock in mining and its share in the total capital stock have again started to decline. Poor production performance has led to reduced investment and the resulting curtailment of the production capacity has again contributed to the decrease in output. This vicious cycle of events will have to be broken by reviving the investment climate in the country. But, the success of this endeavour will ultimately depend on a solution to the political problems of the country.

The analysis of the capital formation in the mining industry also led to the conclusion that mining's fixed investment has become less efficient, owing to an increasing capital/output ratio, especially since the 'seventies. This was ascribed to dwindling ore grades, which require marginally more investment in production and exploration machinery and equipment to yield a certain level of output. Furthermore, the fast rising unit cost of labour and more intensive mining methods have led to a more capital intensive and less labour intensive mining industry. The favourable treatment of mining's capital expenditure for tax purposes is another important reason for the decreasing efficiency of investment in mining.

The backward linkage of mining through its acquisition of capital goods from the rest of the economy was also analysed and, apart from the limitations, which ensue from the low local content of these supplies, the resulting value added, particularly in the construction industries, was at times as high as 5 per cent of the GDP. This again illustrates that mining is in a good position to set off ripple effects throughout the economy by means of a continuous investment programme, and conversely, that curtailed investments in mining will lead to the contraction of other sectors in the economy.

The combined effects of mining's direct value added as well as those resulting indirectly from mining's acquisition of current and capital outlays on the economy of SWA/Namibia were analysed and evaluated in chapter five. From this analysis the real importance of mining to the economy became evident. In addition to income generated through the production processes, further value is added through the spending process originating from mining's ultimate injection of final outputs into the economy. Thus, while mining appeared to have an immediate impact of about 35 per cent on the GDP in 1985, the various ripple effects through the economy have pushed that figure up to around 42 per cent, implying that about 7 per cent of the aggregate value added resulted indirectly from mining's participation in the economy. Between 1970 and 1985 mining's combined direct and indirect contribution to the GDP through the production and spending processes in the economy ranged between 30 and 55 per cent. Another conclusion reached from this analysis is that mining is not only an important income earner for the country as a whole, but is also essential to a number of business enterprises in the country. It was estimated that up to 19 per cent of the value added by private non-mining business enterprises was the result of their forward linkage with the mining industry.

This pivotal role of the mining industry in generating income within the country should be recognised, and duly integrated into a strategy for the proper industrial development of SWA/Namibia.

The employment function of the mining industry was examined in chapter six together with the remuneration of employees in mining. During the period 1950 to 1977 the average annual growth of employment in the mining industry amounted to 4,2 per cent per annum, which exceeded the growth rate in the economically active population. This means that during this period the mining sector was able to attract more labour than the annual addition to the labour market. Since 1977, however, employment in mining has decreased at an average rate of 4,2 per cent per annum, thus aggravating the already existing unemployment problem.

Owing to inflationary trends in SWA/Namibia, the active policy of salary parity between different population groups and a general rise in the standard of living, the remuneration of employees in mining showed a steep rise since the mid-'seventies and during 1977, amounted to almost a quarter of the total remuneration of employees in the country as a whole. After 1977 the share of mining in total remuneration showed a sharp decline, owing to the deteriorating employment situation in mining and growing employment and higher wages in the rest of the economy, particularly in the burgeoning public sector.

Having surveyed certain micro aspects of employment in mining, it was possible to reach two further conclusions. The upsurge of mine wages, particularly in the black section of the labour force, led to a rapid narrowing of the black/white wage gap in mining - from 1:10 during the 'seventies to 1:4 during 1980. This made a considerable contribution towards the more equal distribution of income between the various population groups in mining's labour force and, between labour and non-labour factors of production. The second conclusion was that labour productivity in mining has not kept pace with the sharp rise in real wages since the mid-'seventies. While real wages have begun to increase at a sharp rate, labour productivity has remained more or less unchanged. It was noted that mineral output prices rather than labour productivity became the determining factor of mine wages; a process that in the long run can lead to inflationary pressures on both the demand and the cost side.

Chapter seven outlined the role prices and cost play in the mining industry. During the 'fifties and 'sixties when mineral output prices remained relatively stable, the mining industry could only improve its performance by increasing output and productivity levels. With the rapid escalation of mineral output prices during the mid-'seventies, however, the price parameter became a much more important determinant of the performance of the mining industry. This is indicated by the fact that physical output in mining between 1950 and 1985 increased by only 290 per cent, while mining's output prices showed an increase of 1230 per cent. The sharp rise in mineral output prices since the 'seventies, as well as the fact that mining's output prices remained on average well above price levels in the rest of the economy, above import price levels and above price levels of intermediate inputs in mining, has contributed towards the survival of the mining industry during times when production levels declined sharply. Because of the volatility of mineral output prices, particularly since the 'eighties, the future of mining has become more risky and uncertain.

The analysis of price movements made it possible to determine the role mining plays in SWA/Namibia's terms of trade. With relatively high mineral export prices and the pre-eminence of mineral exports in total exports, it is not surprising that mining has contributed a great deal to the favourable terms of trade. In fact, the prices of SWA/Nambibia's non-mineral exports, which in general did not keep up with the rise in merchandise import prices, were increasingly supported by the more favourable terms of trade of the mineral exports.

Having established movements of input and output prices in the mining industry, it was possible to derive real input and output estimates, which in turn was used to determine the productivity in mining. It was shown that the productivity in the mining industry was declining continuously and could be ascribed to deteriorating ore grade, the high fixed cost component of total cost, and the increasing capital intensity.

It can thus be concluded that the future of the mining industry is far from settled. It is fair to say that the medium-term future of mining in SWA/Namibia is in the balance as a result of the combination of volatile output prices (presently aided artificially by the poor external value of the rand), increasingly growing input prices and falling productivity ratios. Although this situation was brought about mainly by extraneous influences, the stabilisation of output prices through greater beneficiation of raw materials definitely lies within the power of the country's authorities and the mining industry.

The question of distribution of net mining income was discussed in chapter eight. During the period 1970 to 1985 the bulk of mining companies' net income (35 per cent) was left undistributed for purposes of financing of capital investment, mainly in the mining industry itself. 33 per cent was distributed to shareholders, whereas 25 per cent was paid to the government in the form of direct taxes.

To further clarify this subject, the distribution of the industry's total income was also analysed. This exercise showed up different distribution patterns for the different mining industries. It was indicated that while direct and indirect taxes represent the largest expenditure item for diamond mining (29 per cent), intermediate inputs draw the largest portion of non-diamond mining income (41 per cent). Total taxes paid, represent less than 5 per cent of the total income in the case of non-diamond mining, which clearly indicates that there is a major deficiency in the tax regime of non-diamond mining companies. This issue has received more attention in chapter eleven.

The final section of the standard national accounts viz. the financing of the gross investment in mining was analysed in chapter nine. Savings were compared to investment in the industry to determine mining's net lending/net borrowing position in relation to the rest of the economy. During the early 'seventies mining's savings were small and inconsistent, but they grew into substantial amounts after 1977, contributing about one third of total savings in the economy. The diamond mining industry was able to cover the bulk of its investment by internal savings, but the non-diamond mining industry was often not in a position to finance its investment by funds generated internally. These financial shortfalls were chiefly met by foreign capital inflows. Financing of investment in mining from local non-mining sectors is limited, not so much due to insufficient surplus savings generated internally, but due to the underdevelopment of the local capital market as well as the existing financial ties still maintained with foreign investors by multi-national mining companies. After financing its own investment, mining still retains substantial surplus savings, which has contributed significantly to the healthy balance of payments position of SWA/Namibia towards the end of the 'seventies and during the early 'eighties.

In conclusion, one could say that sufficient internal sources of finance are available to warrant substantial investment programmes in mining, and mining related fields. A prerequisite for such developments is firstly to revive the investment climate by proclaiming the investment potential in mining to a wide spectrum of local and foreign investors. And, secondly, the necessary financial structures would have to be established to channel surplus funds in the economy into the mining industry. The development of an appropriate financial structure would involve the establishment of conventional financial institutions, such as mining houses, discount houses and export finance institutions as well as unconventional financial institutions such as a mining bank or a development bank which would open a "mining window". It would also be necessary to introduce certain minimum requirements to compel mining companies to reinvest part of their retained earnings in mining and mining related projects, or alternatively, to redirect part of the government's tax receipts from mining into a mining or development bank.

Chapter ten dealt with mining's relations with the rest of the world, and particular attention was given to the role of mining in SWA/Namibia's balance of payments, and to extraneous influences that affect the performance of the industry. As was to be expected, mining was, is, and will be, the most important source of foreign exchange for a considerable period of time. Even taking into account the imports resulting directly and indirectly from mining's acquisition of current and capital outlays, mining is still able to cover these imports about 2,5 times through its mineral exports. It is striking though, that only half the original export earnings is retained in the country after accounting for dividend payments by the mining industry to foreign shareholders. In order to stabilise the balance of payments, it would be necessary to promote local ownership in mining operations in SWA/Namibia or introduce other measures to desist an excessive outflow of profits.

An analysis of the various countries purchasing SWA/Namibia's minerals, revealed that Japan and the European Community feature most prominently as trading partners. These commercial contacts could prove to be most valuable after independence, but SWA/Namibia's reputation as a reliable supplier must be retained to foster good relations with industrial countries who in turn can provide the necessary technology for the country's mineral and industrial development. Sustained market research is also necessary to establish new and reliable contracts and to enable SWA/Namibia to provide those metals and minerals currently in demand in industrial countries and in industrial processes.

The economic performance of the Western World, exchange rates, technological progress and international competition are some of the international influences which have a marked effect on the performance of the local mining industry. The business cycles of the countries trading with the SWA/Namibian mining industry do not only affect the mineral output, but also the prices at which it is traded. The output of diamonds and uranium, however, is less prone in the short-term to international business cycles than other minerals, since an entirely different set of extraneous forces influences their production. The production of the other minerals on the other hand is fairly consistent with the international business cycle, but is lagging one year behind the economic up- and downturns of the industrial countries, due to the effect of inventory accumulation.

Exchange rates also have a marked effect on the value of mineral exports and the conclusion was reached that during the period 1976 to 1985 the Rand value of mineral exports was favourably influenced by the weakening external value of the Rand. This has been so, particularly since 1981, when the US Dollar began to appreciate rapidly against the Rand. However, many mineral exporters who became so used to the paradoxical exchange rate situation, may begin to experience serious financial difficulties if the external value of the Rand should appreciate rapidly. It was therefore suggested that mining companies should prepare themselves for this possibility by creating contingency reserves.

Local mineral production is also affected by the advancement of technology here and abroad. Non-mineral substances (such as plastics) and minerals not produced locally, as well as recycled metals, are possible substitutes for locally produced minerals. These substitutes - the products of technological progress - may become a major handicap for the future development of locally-occurring minerals. Associated with this is the problem of international competition from other mineral producing countries. Judging by the sharply decreasing market share in world trade, minerals already badly affected have been arsenic, diamonds, lithium, salt and zinc. Every effort should be made to maintain technological progress in the mining industry and processing of minerals. In addition, a favourable investment climate should be created to ensure a continued interest in mineral investment in SWA/Namibia.

Multi-national corporations are particularly active in the local mining industry. Owing to the international operations of multi-nationals, certain problems are experienced by SWA/Namibia and by many developing countries. They are summed up by the fact that the objectives of developing countries and those of multi-national corporations clash on certain basic principles such as taxation, development and the pricing of minerals. These problems mainly stem from a lack of understanding on how best to negotiate with these corporations. It is recommended that thorough investigations should be made of the advantages and disadvantages of multi-national corporations before dealing with these enterprises. Existing agreements and treaties with these corporations should also be reconsidered, to determine whether in fact SWA/Namibia is receiving an equitable share of revenue from its mineral resources.

The performance of the mining industry directly affects the government's financial position, while actions taken by the government through certain fiscal and monetary policy measures can in turn influence the mining industry. The nature of the relationship between mining and the government can therefore have an important bearing on the progress made in economic development. In chapter eleven this relationship was evaluated in some detail. The direct and indirect taxes paid by the mining industry were related to its current income and to total taxes paid in SWA/Namibia.

During the period 1970 to 1985 mining companies distributed on average 43 per cent of their current income to the government in the form of direct and indirect taxes. The ratio between income and tax was estimated to have a marginal rate of 26,5 per cent. Owing to the favourable tax structure applying to the non-diamond mining industry, it only distributed on average 14 per cent of its total current income to the government, compared to the average of 42 per cent for the diamond mining industry.

As a percentage of total taxes paid in the country between 1970 and 1985, the diamond mining industry contributed about 31 per cent, and the non-diamond mining industry about 6 per cent. There are, however, large variations in this source of tax revenue, which is illustrated by the fact that the mining industry's share in total taxes ranged between 17 and 57 per cent within a period of five years. The fluctuations in mining's tax payments directly led to some serious public finance problems, which could be ascribed to the fact that the government began to rely too heavily on mining for its income, and that it was not able to adjust its spending pattern when the public revenue from mining began to slump during the 'eighties.

Problems experienced in the mining industry, such as disorderly small-scale prospecting cum mining, insufficient feedback of prospecting results, the discouragement of further processing, and land-locking, illustrate that the existing minerals policy of the government is not conducive for the orderly and efficient use of the country's mineral resources in economic development. In addition, the present tax regime applicable to mining has some serious deficiencies, which are clearly reflected in wide deviations between actual income generated by mining, and the actual tax proceeds falling due to the government. It was illustrated that certain measures in the present tax system are conducive to the manipulation of certain tax measures at the cost of tax proceeds to the government. The deficiencies of the present tax system stem from certain outdated tax measures applying to the mineral sector. If the government is truely committed to remedy the present drawbacks of the system, tax reforms will become inevitable. The re-assessment of the present tax base and concessions will also be necessary, and it was suggested that greater emphasis should be placed on indirect taxes. Because mineral resources remain depletable assets, it was suggested that an urgent long-term strategy should be adopted to diversify the economic and tax base of the country.

Having surveyed the important findings of this study and identified the typical economic trends in mining, it may be concluded that the mining industry has had an important impact on the economy of SWA/Namibia. However, it was also increasingly recognised that the disappointment of expectations from mineral sector development in certain areas could in many cases be attributed to the government's failure to use the industry's tax contribution to diversify the economic base of the country, and its failure to implement a definite minerals policy. This undoubtedly contributed to the fact that much of the development in the mining industry was on a laissez-faire basis. In recent years production, productivity, employment, investment and tax revenue from mining have deteriorated. Apart from the occasional upsurge in mineral output, many existing mines are rapidly reaching the end of their life-spans and others have already been abandoned. The country is left with only a few medium and large scale mining operations, which also face similar problems of declining reserves, international market disturbances and adverse conditions in local and regional economic and constitutional development.

12.3 GUIDELINES FOR A FUTURE MINERALS POLICY FOR SWA/NAMIBIA

The macro-economic trends outlines in the previous section paint a distressing picture at times, and it can be assumed that if some of these trends continue along the same pattern as in recent years, certain parts of the minerals industry may be facing a major collapse. At the same time, however, it was established that the mining industry possesses an inherent potency, which is conducive to economic development, if it is used optimally, and steered in the right direction. Moreover, the mineral potential of SWA/Namibia is still adequate enough to warrant a pragmatic and positive approach to current problems and conflicts, rather than give in to the cynicism bred by recent adverse developments in the industry. It is essential therefore to conclude this study with a few vital suggestions on reviving economic development using the country's mineral resources as a basis. These suggestions are based on the conceptual considerations with which this study was introduced, and the current experience in the economy outlined in the analytical part of the study. Since chapter one has already given a detailed account of an appropriate minerals policy, it is not intended to repeat all the policy guidelines here, but rather to concentrate on those issues which this study has identified as pressing problems in the mining industry. Suggestions are made on rectifying those problems associated with the macro-economic structure of SWA/Namibia's economy and on certain preparitory actions to ensure a properly structured and administered mining industry.

The fact that the economy is extremely open, was frequently recognised as the most important reason for the forfeiture of economic stimuli - be they in the form of increased mineral exports, a favourable agricultural climate, or growing government spending. The openness of the economy refers to the large import leakage from the production and spending streams in the economy. Furthermore, the savings generated domestically are not redirected to domestic investors, but leave for the South African markets through the savers themselves, or via financial institutions, owing to the inferior nature of the local capital and money market. Conversely, the gross of large borrowings originates from South African and other foreign markets. This detrimental feature of the SWA/Namibian economy will have to be changed over time to provide the economy with an inherent strength and to lessen the vast exogenous influences exerted on its natural macro-economic mechanisms. The most natural solution to this problem would be to grant SWA/Namibia its independence, whereafter the existing economic and financial ties with South Africa, including membership in the Southern African Customs Union and the Rand Monetary Area, would in all probability be reconsidered. This study also indicated how the mining industry could be used to contribute towards the "closing" of the economy to some extent. Through forward and backward integration of mining's outputs and inputs, the import dependence can be reduced and further value could be added through local processing. The diversification of the economic base must be the ultimate objective, as the mineral resources are being gradually drawn down. With stronger backward and forward linkages between primary and secondary industries, the economy will be in a far better position to absorb economic stimuli and assimilate these into economic growth and advancement.

The problem with the excessive flow of financial surpluses beyond the country's borders should be counteracted, not by direct intervention, but through the creation of basic financial institutions, such as discount houses and institutions that intercept and mobilise private and also public savings. Here again the mining industry, which as was indicated in the study generates substantial amounts of surplus savings, can play an important role by providing the necessary economies of scale in the financial flows within newly created money and capital markets. The creation of mining houses, export finance institutions, and even a stock exchange, could put idle capital to more productive use if foreign owned mining companies are being domesticated to a larger degree.

Another prerequisite for a revised minerals policy is to change the current approach towards development planning in SWA/Namibia. Although existing regional development plans have identified various development projects, there simply is not the necessary drive to execute them. This lack of initiative stems from the fact that regional planning is mainly confined to strictly demarcated ethnic areas and does not stipulate the responsibility of and co-operation between different government departments that are involved in the provision of the social and physical infrastructure. The regional development plans prepared for various areas are thus of academic interest only, since they were conducted in an absolute vacuum; that is, without any global development objectives at hand. Often the emphasis was placed too much on structural developments, without taking the economic and ultimately the fiscal returns into consideration. In future the emphasis should be placed on a more integrated approach towards development planning by moving from general development objectives to more specific and detailed planning and ultimately to the identification of individual projects. With this integrated planning approach it becomes necessary to calibrate the planning done by various government institutions with the mineral development potential in different areas.

It is an imperative first step to systematically survey the vast stretches of unexplored and underexplored terrain to assess its mineral and energy potential, water resources and the land use value. In addition, it is also essential to have access to, and control over, information on development potential still in the hands of private prospectors. This study has indicated that the government is still deprived of valuable information about mineral reserves and the results of private exploration. If development planning is to succeed, this information will have to be made available to policy makers and development planners. The study has also shown that the size and extent of SWA/Namibia's mineral potential can form a perfect basis for regional development, but here again, this has to be accompanied by its integration into a broader development plan to provide linkages between identified potential mining projects, and possible industrial schemes.

Having determined the mineral potential and how it fits in with proposed mining, industrial and infrastructural development, this information must be recast into financial terms in such a format that the investor can assess the investment potential of SWA/Namibia. Selling the country's mineral investment potential is an art which has not yet been mastered, but which is an absolute necessity in a highly competitive world.

Another basic policy guideline is for the government to clearly and unequivocally state its policy towards ownership and control of mineral resources and the industry, as well as the tax and contractual arrangements applying to the mining industry. The government policy on state participation in mining in SWA/Namibia is not clear, since on the one hand it has explicitly stated that the state's participation in mining will be limited, while on the other hand it has become a shareholder of a major mining concern. If the government is in favour of equity participation, it must provide a clear definition and delineation of the public and private involvement if it is to instil confidence in potential investors. A more acceptable alternative for state participation, however, is to afford the opportunity to private individuals to participate in mining ventures. This would inevitably require the creation of some kind of financial institution to cater for primary and secondary investors.

As far as government control over the country's mineral resources is concerned, it is fortunate that the domanial system, whereby the mineal ownership rests in the state, applies in SWA/Namibia. The government in turn has an obligation to the present and future generations of the country not to allow the uncontrolled exploitation of its mineral resources. To ensure an optimal rate of exploitation, again requires complete knowledge about the reserves, grades and extraction techniques. Tax measures can serve as an important instrument to discourage overexploitation and to encourage faster exploitation where ore reserves are adequate. But, if tax measures have little or no effect on conservation, direct intervention in mining becomes inevitable. Appropriate measures should also be introduced to counter undesirable mining practices currently experienced in SWA/Namibia, such as land-locking, excessive speculation with mining grants, and high-grading. An organised and co-ordinated system for the granting of prospecting and mining rights is a necessity for the orderly functioning of the mineral industry.

The fiscal regime applied to the mining sector is of major importance for the realisation of many other policy objectives. The primary aim of the taxation of mineral projects should be to define the mineral rent of the mining industry and to tax it appropriately. This will ultimately depend on the government's <u>willingness</u> and <u>ability</u>, as well as its bargaining power, to tax or otherwise mobilise part of the incomes originating from mining. Although conditions in the country's mining industry - be it financial, technological or socio-economic - have changed dramatically over the past six decades, the tax system has not changed meaningfully over this period. For this reason it is essential that the tax authorities should be engaged in continual research into the different tax-contract systems, to be able to choose between different tax systems which best capture the mineral rent of the industry. When devising certain tax reforms, care should be taken to accommodate the interests of both parties to avoid a situation where the fiscal terms may later prove too severe, leading to the premature abandonment of the mining venture, or too generous, leading to an excessively fast exploitation of a given mineral deposit. Because all mines are not identical in terms of reserves, ore grade and mineral prices, it is quite possible to devise different tax systems for different mineral deposits. Although indirect taxes such as royalties are not very successful in capturing the mineral rent of the industry, some form of indirect taxation will have to be introduced to counter the manipulation of direct taxation and other tax concessions. Tax concessions on the other hand must be considered carefully, and its use by mines monitored to ensure that they serve their intended objective, namely the promotion of mine development.

To summarise, the overall requirement of a positive and pragmatic minerals policy is that all public policies affecting the mining industry, directly and indirectly, should be clearly defined. Unambiguous and stable investment and tax codes are a must. Policy must start by identifying objectives so that all parties with a role to play can move in the same direction. It must be accompanied by the creation of adequate mechanisms and agencies to monitor and administer the sector. The government on the other hand, must respect its agreements, except when national interest has been grossly, illegally or unfairly violated. At the end of the day, however, it is not the quantity or quality of agreements, rules and regulations, that determines economic development, but the way in which mutual confidence and trust is used to reconcile the interests of the country and those of investors. This requires careful handling, imagination and the ability on both sides to recognise one another's interests and to find solutions to the inevitable problems. Companies, on their part, must learn to recognise and respect the needs and aspirations of SWA/Namibia and its people. Companies, national or foreign, must show increased social awareness, increased willingness to participate in joint ventures, and increased readiness to train nationals as well as to promote local processing and hence domestic value added, where economic.

Where does SWA/Namibia's mining industry go from here, and what are its future prospects? In accordance with its own experience to date and the experience of developing economies in similar situations, there are some definite signs that the mining industry and the government will have to adjust to the new obstacles and challenges facing both the industry and the economy as a whole. Some of these obstacles will merely be perpetuations of existing conflicts, and these will have to be recognised and eradicated.

In the short run, the mining industry may be facing more unstable business cycles and excessive volatility of prices, making planning difficult and leading to a rapid weakening in fiscal stability. In addition, the rapidly rising capital costs and increased costs of finance, coupled with decreasing availability of finance for mining, owing to the long-term nature of the investment required, and the relative high risk involved due to the political uncertainty, will impede the future development of large mining projects considerably.

However, this study has also shown that the mining industry has the potential to develop into an industry which may revitalise and stabilise overall economic activity in the country. Whether mining will be able to lead the country out of its present economic stagnation into long-term economic development, will necessarily rest to a large extent on the availability of mineral reserves. It will also depend on what type of minerals policy is to be accepted and implemented, whether the full potential of country's mineral resources are exploited conservatively, and whether the mining industry is properly monitored and appropriately integrated into other sectors of the economy. Ultimately, the success of an economic revival in the mining industry will depend on political considerations, and whether policy makers are willing and able to devise and implement reform programmes along the lines suggested here. This is so, since it is evident from history that economic development has always been associated with, and has perhaps even resulted from, political and social changes; economic development has not always been purely economic.

12.4 RESEARCH RECOMMENDATIONS

As certain aspects in this study were analysed in isolation, additional research may be justified to follow up the conclusions reached in this study, and to test their utility in practical affairs. Several kinds of information are needed, of which the following seem to be the most urgent:

(a) Future mineral potential and development and its impact on, and its relation to, industrial and economic development with particular emphasis on mechanisms to "close" the highly open economy.

(b) A more detailed presentation of an appropriate minerals policy for SWA/Namibia.

(c) The simulation of various tax contract systems to establish which is most effective in capturing the mineral rent.

APPENDICES OF TECHNICAL DATA AND CALCULATIONS

APPENDIX ONE

TABLE S.1 - THE MINERALS OF SWA/NAMIBIA

MINERAL	CHEMICAL FORMULA	LOCATION OF IMPORTANT OCCURRENCES	PRINCIPAL APPLICATION OR USE OF MINERAL
PRECIOUS METALS:			
Gold	Au	Tsumeb; Otjihase; Oamites; Klein Aub; Ondundu; Navachab (Karibib)	Formerly as a currency standard; monetary and investment medium, jewellery; in scientific and electrical apparatus.
Silver	Ag	Tsumeb; Otjihase; Oamites; Klein Aub	Photographic material; electric and electronic products; jewellery and plating.
PRECIOUS STONES:			
Diamonds	C	Oranjemund; Orange River; Rocky Point	Jewellery; investment medium; industrial abrasives.
NON-FERROUS BASE METALS:			
Arsenic	As	Tsumeb; Rosh Pinah	Insecticides, weedkillers, dips, wood preservative.
Bismuth	Bi (variable)	Tantalite Valley; pegmatite area - Karibib	Low-melting alloys; pharmaceuticals.
Cadmium	Cd	Tsumeb; Rosh Pinah	Corrosion resistant products; electroplating.
Chromite	$FeCr_2O_4$	Rehoboth	Valuable refractory material used for lining furnaces. Also the sole source of chromium metal used widely in stainless steel.
Cobaltite	CoAsS	Traces in Tsumeb-mineralisation; Haib river	Manufacture of superalloys, wear-resistant materials, ceramics.
Columbite	$(Fe,Mn)(Nb,Ta)_2O_6$	Tantalite Valley; pegmatite area - Karibib	Ore of niobium; high strength low alloy steel; stainless steel.
Copper	Cu	Tsumeb; Otjihase; Oamites; Klein Aub	Electrical uses; in the production of alloys, mainly brass.
Gallium	Ga	Tsumeb	Electronic devices for computers, like light-emitting diodes.
Germanite	$Cu_3(Ge,Fe)(S,As)_4$	Tsumeb	Ore of germanium; transistor diodes, rectifiers, infra-red optics.
Lithium:			
Ambligonite	$(Li,Na)Al(PO_4)(F,OH)$	Pegmatite areas Karibib, Omaruru	Ore of lithium; ceramics; in chemicals and high temperature grease.
Lepidolite	$LiKAl_2(OH,F)_2(Si_2O_5)_2$	Pegmatite areas Karibib, Omaruru	Ore of lithium; glass, ceramics.
Petalite	$LiAlSi_4O_{10}$	Pegmatite areas Karibib, Omaruru	Ore of lithium; glass, ceramics.
Spondumene	$LiAlSi_2O_6$	Pegmatite areas Karibib, Omaruru	Ore of lithium; ceramics, some are cut as gemstones.
Lead	Pb	Tsumeb; Rosh Pinah; Deblin; Berg Aukas	Batteries, petrol, pigments, cable sheathing, ammunition.
Manganese	Mainly MnO	Otjosondu	Manufacture of steel.
Molibdenite	MoS_2	Onganja; Haib river	Manufacture of stainless, heat resistant and high-strength steel.
Nickel	Ni	Traces in Tsumeb-mineralisation; Kaokoland	Electroplating; in chemical, electrical, petroleum and steel industries.
Pollicite	$(Cs,Na)_2Al_2Si_4O_{12}.H_2O$	Pegmatite area - Karibib	Ore of caesium; ionic engines for space travel.
Rutile	TiO_2	Omaruru (Giftkuppe)	Source of titanium; used in aerospace gas turbine engines.
Tantalum:			
Microlite	*	Tantalite Valley	Source of tantalum; capacitors, rectifiers, super alloys.
Tantalite	$(Fe,Mn)(Ta,Nb)_2O_6$	Tantalite Valley; Damaraland	Ore of tantalum; capacitors, rectifiers, super alloys.
	* $(Ca,Na)_2(Ta,Nb)_2O_6(O,OH,F)$		

APPENDIX 1 / Continued

TABLE S.1 - THE MINERALS OF SWA/NAMIBIA / Continued

MINERAL	CHEMICAL FORMULA	LOCATION OF IMPORTANT OCCURRENCES	PRINCIPAL APPLICATION OR USE OF MINERAL
NON-FERROUS BASE METALS / continued			
Tin	Sn	Damaraland	Tinplate, solders, bearing alloys, bronze.
Tungsten:			
Scheelite	$CaWO_4$	Cape Cross; Windhoek (Natas)	Ore of tungsten; cutting and wear-resistant materials.
Wolframite	$(Fe,Mn)WO_4$	Omaruru (Kranzberg); Damaraland	Ore of tungsten; cutting and wear-resistant materials.
Vanadium pentoxide	V_2O_5	Berg Aukas; Abenab	Source of vanadium; alloy in steel to toughen and strengthen.
Zinc	Zn	Rosh Pinah; Berg Aukas; Deblin; Tsumeb	Zinc-base alloy; die casting; galvanizing; brass.
NON-METALLICS:			
Apatite	$Ca_5(PO_4)_3(Fl,Cl,OH)$	Okahandja (Ojisazu)	Source of phosphate used in fertilisers.
Barytes	$BaSO_4$	Rehoboth; Tsumeb	Ingredient of drilling mud for oil and gas; manufacture of paints and filler for paper.
Beryl	Be	Pegmatite areas - Karibib; Damaraland; Karasburg	Ore of beryllium which is used in atomic energy process; some varieties are prized as gemstones.
Calcite	$CaCO_3$	Swakopmund; Rehoboth; Mariental	Optical industry; manufacture of cement; flux in smelting of metallic ores.
Corundum	Al_2O_3	Usakos (Sandamap)	Abrasive and as a precious stone.
Dumortierite	$Al_7O_3(BO_3)(SiO_4)_3$	?	Manufacture of porcelain for spark plugs.
Feldspar	$(K,Na)AlSi_3O_8$	Pegmatite areas - Karibib; Omaruru	Used in glass, pottery and enamel.
Fluorspar	CaF_2	Omaruru (Omburo); Otjiwarongo (Okuruso)	Flux in steel making; pure transparant fluorspar are used for optical purposes.
Graphite	C	Bethanien (Aukam)	Electrodes and nuclear reactors; lubricants.
Gypsum	$CaSO_4.2H_2O$	Swakopmund (Namib-Naukluft Park)	Cement; plaster of Paris; fertilisers.
Lime, hydrasol	CaO	Usakos; Grootfontein	Agriculture; chemical industry; water softening.
Limestone	$CaCO_3$	Usakos; Karibib; Tsumeb; Grootfontein	Cement; smelting; chemical and metallurgical industries.
Mica (muscovite)	$KAl_2(AlSi_3O_{10})(OH)_2$	Pegmatite areas - Karibib; Damaraland	Dielectric and insulating material.
Nitre	KNO_3	Associated with artesian waters at Maltahöhe	Source of nitrates for explosives, fertiliser, and metallurgical and chemical processes.
Pyrophyllite	$Al_2Si_{10}(OH)_2$	Damaraland	As a carrier for insecticides; ornamental stone.
Quartz crystal	SiO_2	Karibib; Windhoek.	Glass of high purity used for optical or electronic purposes.
Refractories:			
Andalusite	$\left.\right\}$ Al_2SiO_5	Windhoek (Kyanite kop)	$\left.\right\}$ Refractory products; ceramic industry.
Kyanite		Windhoek (Kyanite kop)	
Sillimanite		Windhoek (Kyanite kop); Aus	

APPENDIX 1 / Continued

TABLE S.1 - THE MINERALS OF SWA/NAMIBIA / Continued

MINERAL	CHEMICAL FORMULA	LOCATION OF IMPORTANT OCCURRENCES	PRINCIPAL APPLICATION OR USE OF MINERAL
NON-METALLICS / continued			
Salt:			
Coarse	$NaCl$	Marine salt pans; Koës	Chemical industries; source of sodium, chlorine.
Rock	$NaCl$	Marine salt pans; Koës	Animal feed.
Snoek	$NaCl$	Marine salt pans; Koës	Fishing industry as preservative.
Fine	$NaCl$	Marine salt pans; Koës	Food manufacture.
Table	$NaCl$	Marine salt pans; Koës	Domestic use.
Sepiolite	$Mg_3Si_4O_{11}.5H_2O$	Gobabis	Manufacture of bricks.
Silica	SiO_2	Tsumeb	Flux in smelting; glass industry.
Sodium compounds:			
Soda ash (Trona)	$Na_3H(CO_3)_2.2H_2O$	Owambo (Otjivalunda pans)	Glass, chemicals, paper and pulp.
Thenardite	Na_2SO_4	Owambo (Otjivalunda pans)	Paper industry, glass, ceramic glaze, detergent.
Burkeite	$N_6(CO_3)(SO_4)_2$	Owambo (Otjivalunda pans)	(Probably the same as for soda ash and thenardite).
Talc	$Mg_3Si_4O_{10}(OH)_2$	Otjiwarongo	Talcum and face powders; also in ceramics, electrical porcelain, filler in paint, paper and rubber.
Thulite	$Ca_2MnAl_3Si_3O_{12}(OH)$	?	Ornamental stone.
Wollastonite	$CaSiO_3$	Usakos; Karibib	Wall tiles, ceramic products, paints.
FERROUS BASE METALS:			
Iron pyrite	FeS_2	Matchless; Otjihase	Manufacture of sulphric acid; used locally for smelter purposes and uranium processing.
Iron ore	Fe_2O_3 / Fe_3O_4	Kalkfeld; Kaokoland (Ongaba, Owihende)	Iron and steel industries; used in the smelter process.
SOURCES OF ENERGY:			
Uranium-oxide	U_3O_8	Rössing; Trekkopje; Langer Heinrich; Tubas	Nuclear power generation.
Coal		Aranos; Toscanini	Petroleum products; power generation.
Natural gas		Off-shore Oranjemund (Kudu-gas field)	Petroleum products; power generation.
Crude oil (?)		Etosha (?); Keetmanshoop (in form of oil shale)	Petroleum products; power generation.
ROCK:			
Aragonite	$CaCO_3$	Karibib; Platveld-area	Ornamental stone.
Dolerite	(ROCK)	Widespread over SWA/Namibia	Building aggregate; rail balast.
Marble	$CaMg(CO_3)_2$ to $CaCO_3$	Karibib; Rehoboth	Dimension stone; building aggregate; terrazzo.
Slate	(ROCK)	Vioolsdrift	Roofing and facing tiles; paving stone.

APPENDIX 1 / Concluded

TABLE S.1 – THE MINERALS OF SWA/NAMIBIA / Concluded

MINERAL	CHEMICAL FORMULA	LOCATION OF IMPORTANT OCCURRENCES	PRINCIPAL APPLICATION OR USE OF MINERAL
SEMI-PRECIOUS STONES:			
Amazonite	$KAlSi_3O_8$	Maltahöhe (Neuhof)	Jewellery, ornaments, mineral collections.
Beryl: Aquamarine	$Be_3Al_2(SiO_3)O_6$	Damaraland (Spitzkopje)	
Emerald	$Be_3Al_2Si_6O_{18}$	Pegmatite area – Usakos	
Heliodor		Damaraland (Spitzkopje)	
Morganite		Karibib (Rubicon mine)	
Chalcedony	SiO_2	Okahandja (Troje)	
Agate		Karasburg (Ysterputs); Skeleton Coast Park	
Jasper		Mariental, Rössing mountains	
Carnelian		Kaokoland	
Quartz: Amethyst		Grootfontein (Platfeld)	
Citrin		Pegmatite area – Karibib	
Green		?	
Opal	$SiO_2.nH_2O$	?	
Rose	SiO_2	Karasburg (Border); Rössing mountains	
Smoky		Rössing mountains	
Tiger eye		?	
Sodalite	$Na_8Al_6SiO_{24}Cl_2$	Kaokoland (Swatbooisdrift)	
Topaz	$Al_2SiO_4(OH,F)_2$	Damaraland; Omaruru	
Tourmaline	*	Pegmatite areas – Karibib; Omaruru; Damaraland	
	* $(Na,Ca)(Mg,Fe^2,Fe^2,Al,Li)_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$		

NOTES: ? denotes that the mineral was produced according to official records, but that the location of the occurrence is not known.
(?) denotes a possible occurrence.

SOURCES:

Berger (1966: 49-53);
FNDC (1979, 1981a,1981b and 1984);
Hamilton, Woolley & Bishop (1977);
Hurlbut (1966);
McIver (1966);
van der Merwe (1984);
Page (1980);
Schalk (1985: 71-77);
Seeger (1980: 3-6);
Sohnge (1967);
Tsumeb Corporation Limited (1970 to 1983);
Woolley (1978);
Department of Economic Affairs (1950 to 1984);

APPENDIX TWO

MULTIPLIER CALCULATIONS A

THE ESTIMATION OF THE COEFFICIENT OF INDUSTRIAL INTERMEDIATION (λ) AND THE WEIGHTED AVERAGE OF INDUSTRIAL VALUE ADDED (γ) OF MINING'S CURRENT OUTLAYS

In order to explain the method of derivation of the backward multiplier effects resulting from mining's current outlays, it is necessary to present a brief discussion of the functioning and usage of the input-output table. The framework of the input-output table is shown in table S.2.

TABLE S.2 - THE FRAMEWORK OF THE INPUT-OUTPUT TABLE

OUTPUTS / INPUTS	Intermediate outputs for: Industries 1.........n	Final outputs for: C+G+I+X	TOTAL SUPPLY	less: Imports	TOTAL OUTPUTS
Intermediate inputs from: Industries 1 : : : : n	Quardrant 2	Quardrant 3			
Primary inputs Net indirect taxes	Quardrant 1	Quardrant 4			
TOTAL INPUTS					

C = Private consumption; G = Public consumption;
I = Gross investment; X = Exports of goods and non-factor services.

The underlying principle of the input-output table lies in the fact that the rows (horizontal entries) represent the outputs of the identified industries and the columns represent the inputs of the same industries. The inputs are divided into the intermediate inputs and the primary inputs and the outputs are divided into intermediate outputs and final outputs, less imports. The total of the inputs in each industry's column is equal to the outputs less imports in that industry's particular row. The table may thus be divided into four quadrants as illustrated in table S.2.

Quadrant 2 contains the intermediate inputs of the industries in the columns and the intermediate outputs in the rows. In this quadrant the inter-industry transactions take place. Each industry will thus be characterised by an inflow of inputs obtained from other industries and through imports and by an outflow of its own output that passes on to other industries and to final markets indicated as quadrant 3. In addition to inputs purchased from other industries, factors of production such as labour and entrepreneurship will be used directly by each industry in creating its product; such inputs are called primary inputs or value added (quadrant 1) (Stadler, 1973: 196-197). The sum of all the value added by each industry represents the domestic product. Table A.16 in the statistical appendix gives details of the input-output table for SWA/Namibia for 1980 which was constructed especially for use in this study to determine the multiplier effects which originate in the mining industry.

A fundamental assumption of input-output analyses *per se* is that each industry uses other industries' outputs as well as primary inputs strictly in fixed proportions. Another assumption made in the input-output table of SWA/Namibia for 1980, is that those industries for which no input data were available, use inputs in the same proportion as the industries of South Africa and SWA/Namibia combined during 1978. This should not, however, reduce the credibility of using the input-output table for determining multiplier effects of the three mining industries, since the structure of the economies of the two countries is very similar.

Given these assumptions, calculations are made through matrix algebra to determine the effects of a change in one quadrant on the other quadrants. In this regard, an autonomous change is assumed in mineral exports (quadrant 3) to estimate the resulting changes and the extent of these changes (multiplier effects) in quadrants 1 and 2.

From the input-output table presented in table A.16 in the statistical appendix, the following calculations are made to arrive at coefficients which may be used in calculating multiplier effects (Bulmer-Thomas, 1982: 54-60):

(a) Input coefficients of total inputs are calculated ($a_{ij} = x_{ij}/X_j$) and stated in matrix format [A];

(b) Matrix [A] above is deducted from an evenly sized unit matrix [I], which gives [I-A].

(c) From matrix [I-A] above, the inverse input matrix is calculated $[I-A]^{-1}$. Computer programming becomes inevitable at this stage.

Using matrix $[I-A]^{-1}$ above, estimations of mining's backward multiplier can be made. In this appendix the coefficient of industrial intermediation (λ) and the weighted average of industrial value added

(γ) of mining will be presented. This analysis is based mainly on a similar one done by Lombard and Stadler (1980: 17-20), except that the value added in the various calculations is measured at market prices rather than at factor cost to prevent "net indirect taxes" from being regarded as intermediate inputs, which they are not.

Let A = total output of the particular mining industry;
B = value added directly by mining;
C = A - B = mining's outlay on intermediate products;
D = gross output other than mining to produce intermediate output for mining;
E = value added by D;
F = B + E;
λ = D/C and γ = E/D;
α = the value added coefficients (value added over gross value of total inputs)
i = subscript denoting the various industries; and
j = subscript denoting the relevant mining industry examined.

The value of A is exogenous to the model, in other words, a given factor. $B = A.\alpha_j$ and is found by calculating the value of α_j from the information in the first quadrant of the standard input-output table.

D, E and F are found as follows:

$$D = A.\Sigma\, a_{ij}.g_i - A.a_{ij}.g_j$$

where a_{ij} = the inverse input coefficient of intermediate demand by industry j (mining) for the output of industry i; and

g_i = the local content of the output of industry i;

$$E = A.\Sigma\, a_{ij}.g_i.\alpha_i + A.g_j.\alpha_j$$

$$F = A.\Sigma\, a_{ij}.g_i.\alpha_i + A.a_{ij}.\alpha_j(1-g_j)$$

where the second term provides for the elimination of the effect of any initial (and only initial) imports of industry j.

Details of the final calculations of the coefficients described above are presented below in tables S.3 to S.5 for diamond, uranium and other mining respectively. Tables S.6 gives details of the calculations of the value added resulting directly (B above) and indirectly (E above) from mining's acquisition of intermediate inputs (C above).

TABLE S.3 - COEFFICIENTS USED IN CALCULATING BACKWARD MULTIPLIER EFFECTS OF DIAMOND MINING ON THE GDP, 1980

INDUSTRY	aij	gi	αi	aij.gi	aij.gi.αi
1. Cattle farming	0.00144	0.94884	0.68908	0.00137	0.00094
2. Sheep and goat farming	0.00130	1.00000	0.61310	0.00130	0.00080
3. Other agriculture and forestry	0.00254	0.30834	0.65861	0.00078	0.00052
4. Fishing	0.00004	0.93352	0.81420	0.00004	0.00003
5. Diamond mining	1.00063	0.99838	0.90100	0.99901	0.90011
6. Coal mining	0.00521	0.00000	0.00000	0.00000	0.00000
7. Uranium mining	0.00000	1.00000	0.59049	0.00000	0.00000
8. Other mining	0.00033	0.98411	0.52802	0.00032	0.00017
9. Meat processing	0.00044	0.98668	0.15964	0.00043	0.00007
10. Dairy products	0.00021	0.78775	0.09068	0.00017	0.00002
11. Fish processing	0.00010	0.90558	0.33331	0.00009	0.00003
12. Vegetable and animal oils and fats	0.00015	0.90257	0.05782	0.00014	0.00001
13. Grain mill products	0.00015	0.49607	0.00675	0.00007	.00000
14. Bakery products	0.00003	0.87007	0.27075	0.00003	0.00001
15. Other food products	0.00021	0.06038	0.28354	0.00001	.00000
16. Prepared animal feeds	0.00025	0.41610	0.10089	0.00010	0.00001
17. Malt liquors and malt	0.00018	0.94683	0.33384	0.00017	0.00006
18. Other beverages and tobacco	0.00016	0.21934	0.33002	0.00004	0.00001
19. Textiles, excl. clothing	0.00265	0.08095	0.09169	0.00021	0.00002
20. Clothing	0.00040	0.07214	0.14519	0.00003	.00000
21. Tanneries, leather products and footwear	0.00019	0.26531	0.07948	0.00005	.00000
22. Wood, wood products and furniture	0.00108	0.15497	0.37407	0.00017	0.00006
23. Pulp, paper and paper products	0.00240	0.00097	0.33333	.00000	.00000
24. Printing and publishing	0.00185	0.31467	0.46101	0.00058	0.00027
25. Fertilisers and pesticides	0.00072	0.00000	0.00000	0.00000	0.00000
26. Plastic materials and man-made fibres	0.00353	0.04188	0.30906	0.00015	0.00005
27. Rubber products	0.00465	0.02780	0.06357	0.00013	0.00001
28. Basic chemical products, petroleum and coal products	0.01272	0.00000	0.00000	0.00000	0.00000
29. Paints, cleaning compounds and other chemical products	0.00559	0.27456	0.27717	0.00153	0.00043
30. Non-metallic mineral products	0.00123	0.19092	0.44100	0.00023	0.00010
31. Basic metal industries	0.00802	0.00000	0.00000	0.00000	0.00000
32. Structural metal products	0.00027	0.34640	0.34096	0.00009	0.00003
33. Other fabricated metal products, excl. machinery and equipment	0.00653	0.24490	0.36738	0.00160	0.00059
34. Agricultural machinery and equipment	0.00004	0.03351	0.24082	.00000	.00000
35. Other machinery, excl. electrical	0.01620	0.01046	0.31885	0.00017	0.00005
36. Electrical machinery, apparatus and supplies	0.00377	0.00208	0.29333	0.00001	.00000
37. Radio and TV equipment and electrical appliances and housewares	0.00390	0.00000	0.00000	0.00000	0.00000
38. Motor vehicles	0.00000	0.00240	0.17857	0.00000	0.00000
39. Motor vehicle parts and accessories	0.00096	0.22395	0.44734	0.00021	0.00010
40. Other transport equipment	0.00067	0.00447	0.59494	.00000	.00000
41. Other manufacturing industries	0.00121	0.06315	0.33009	0.00008	0.00003
42. Electricity supply	0.02319	0.88769	0.39609	0.02059	0.00815
43. Water supply	0.00061	1.00000	0.34391	0.00061	0.00021
44. Building construction	0.00055	0.76957	0.15242	0.00042	0.00006
45. Civil engineering and other construction	0.00045	0.77461	0.34785	0.00035	0.00012
46. Wholesale and retail trade	0.01871	0.94899	0.55944	0.01776	0.00993
47. Transport	0.00920	0.78169	0.56161	0.00719	0.00404
48. Communication	0.00358	0.93322	0.45606	0.00334	0.00152
49. Other services	0.04120	0.71914	0.59695	0.02963	0.01769
TOTAL				1.08921	0.94625

aij = Inverse coefficients; gi = Local component of total supply; αi = Factor input coefficient.
SOURCE OF BASIC DATA: Table A.16.

TABLE S.4 - COEFFICIENTS USED IN CALCULATING BACKWARD MULTIPLIER EFFECT OF URANIUM MINING ON THE GDP, 1980

INDUSTRY	aij	gi	αi	aij.gi	aij.gi.αi
1. Cattle farming	0.00123	0.94884	0.68908	0.00117	0.00080
2. Sheep and goat farming	0.00615	1.00000	0.61310	0.00615	0.00377
3. Other agriculture and forestry	0.00544	0.30834	0.65861	0.00168	0.00110
4. Fishing	0.00010	0.93352	0.81420	0.00009	0.00008
5. Diamond mining	0.00343	0.99838	0.90100	0.00342	0.00309
6. Coal mining	0.01290	0.00000	0.00000	0.00000	0.00000
7. Uranium mining	1.00000	1.00000	0.59049	1.00000	0.59049
8. Other mining	0.00909	0.98411	0.52802	0.00895	0.00472
9. Meat processing	0.00142	0.98668	0.15964	0.00140	0.00022
10. Dairy products	0.00072	0.78775	0.09068	0.00057	0.00005
11. Fish processing	0.00028	0.90558	0.33331	0.00025	0.00008
12. Vegetable and animal oils and fats	0.00094	0.90257	0.05782	0.00085	0.00005
13. Grain mill products	0.00064	0.49607	0.00675	0.00032	.00000
14. Bakery products	0.00009	0.87007	0.27075	0.00008	0.00002
15. Other food products	0.00070	0.06038	0.28354	0.00004	0.00001
16. Prepared animal feeds	0.00068	0.41610	0.10089	0.00028	0.00003
17. Malt liquors and malt	0.00057	0.94683	0.33384	0.00054	0.00018
18. Other beverages and tobacco	0.00037	0.21934	0.33002	0.00008	0.00003
19. Textiles, excl. clothing	0.01539	0.08095	0.09169	0.00125	0.00011
20. Clothing	0.00328	0.07214	0.14519	0.00024	0.00003
21. Tanneries, leather products and footwear	0.00056	0.26531	0.07948	0.00015	0.00001
22. Wood, wood products and furniture	0.00386	0.15497	0.37407	0.00060	0.00022
23. Pulp, paper and paper products	0.00902	0.00097	0.33333	0.00001	.00000
24. Printing and publishing	0.00691	0.31467	0.46101	0.00217	0.00100
25. Fertilisers and pesticides	0.00219	0.00000	0.00000	0.00000	0.00000
26. Plastic materials and man-made fibres	0.01653	0.04188	0.30906	0.00069	0.00021
27. Rubber products	0.01170	0.02780	0.06357	0.00033	0.00002
28. Basic chemical products, petroleum and coal products	0.05654	0.00000	0.00000	0.00000	0.00000
29. Paints, cleaning compounds and other chemical products	0.04025	0.27456	0.27717	0.01105	0.00306
30. Non-metallic mineral products	0.00715	0.19092	0.44100	0.00137	0.00060
31. Basic metal industries	0.05307	0.00000	0.00000	0.00000	0.00000
32. Structural metal products	0.00123	0.34640	0.34096	0.00043	0.00015
33. Other fabricated metal products, excl. machinery and equipment	0.04521	0.24490	0.36738	0.01107	0.00407
34. Agricultural machinery and equipment	0.00013	0.03351	0.24082	.00000	.00000
35. Other machinery, excl. electrical	0.07403	0.01046	0.31885	0.00077	0.00025
36. Electrical machinery, apparatus and supplies	0.02215	0.00208	0.29333	0.00005	0.00001
37. Radio and TV equipment and electrical appliances and housewares	0.00131	0.00000	0.00000	0.00000	0.00000
38. Motor vehicles	0.00000	0.00240	0.17857	0.00000	0.00000
39. Motor vehicle parts and accessories	0.00351	0.22395	0.44734	0.00079	0.00035
40. Other transport equipment	0.01426	0.00447	0.59494	0.00006	0.00004
41. Other manufacturing industries	0.00665	0.06315	0.33009	0.00042	0.00014
42. Electricity supply	0.05689	0.88769	0.39609	0.05050	0.02000
43. Water supply	0.00274	1.00000	0.34391	0.00274	0.00094
44. Building construction	0.00192	0.76957	0.15242	0.00148	0.00023
45. Civil engineering and other construction	0.00170	0.77461	0.34785	0.00132	0.00046
46. Wholesale and retail trade	0.05761	0.94899	0.55944	0.05467	0.03059
47. Transport	0.04000	0.78169	0.56161	0.03127	0.01756
48. Communication	0.01056	0.93322	0.45606	0.00985	0.00449
49. Other services	0.15625	0.71914	0.59695	0.11237	0.06708
TOTAL				1.32150	0.75637

aij = Inverse coefficients; gi = Local component of total supply; αi = Factor input coefficient.
SOURCE OF BASIC DATA: Table A.16.

TABLE S.5 - COEFFICIENTS USED IN CALCULATING BACKWARD MULTIPLIER EFFECTS OF OTHER MINING ON THE GDP, 1980

INDUSTRY	aij	gi	∝i	aij.gi	aij.gi.∝i
1. Cattle farming	0.00636	0.94884	0.68908	0.00603	0.00416
2. Sheep and goat farming	0.00605	1.00000	0.61310	0.00605	0.00371
3. Other agriculture and forestry	0.00674	0.30834	0.65861	0.00208	0.00137
4. Fishing	0.00013	0.93352	0.81420	0.00012	0.00010
5. Diamond mining	0.00211	0.99838	0.90100	0.00211	0.00190
6. Coal mining	0.03789	0.00000	0.00000	0.00000	0.00000
7. Uranium mining	0.00000	1.00000	0.59049	0.00000	0.00000
8. Other mining	1.02887	0.98411	0.52802	1.01252	0.53463
9. Meat processing	0.00163	0.98668	0.15964	0.00161	0.00026
10. Dairy products	0.00092	0.78775	0.09068	0.00072	0.00007
11. Fish processing	0.00038	0.90558	0.33331	0.00034	0.00011
12. Vegetable and animal oils and fats	0.00094	0.90257	0.05782	0.00085	0.00005
13. Grain mill products	0.00076	0.49607	0.00675	0.00038	.00000
14. Bakery products	0.00011	0.87007	0.27075	0.00010	0.00003
15. Other food products	0.00089	0.06038	0.28354	0.00005	0.00002
16. Prepared animal feeds	0.00096	0.41610	0.10089	0.00040	0.00004
17. Malt liquors and malt	0.00081	0.94683	0.33384	0.00077	0.00026
18. Other beverages and tobacco	0.00053	0.21934	0.33002	0.00012	0.00004
19. Textiles, excl. clothing	0.01243	0.08095	0.09169	0.00101	0.00009
20. Clothing	0.00198	0.07214	0.14519	0.00014	0.00002
21. Tanneries, leather products and footwear	0.00048	0.26531	0.07948	0.00013	0.00001
22. Wood, wood products and furniture	0.00391	0.15497	0.37407	0.00061	0.00023
23. Pulp, paper and paper products	0.01054	0.00097	0.33333	0.00001	.00000
24. Printing and publishing	0.00779	0.31467	0.46101	0.00245	0.00113
25. Fertilisers and pesticides	0.00267	0.00000	0.00000	0.00000	0.00000
26. Plastic materials and man-made fibres	0.01675	0.04188	0.30906	0.00070	0.00022
27. Rubber products	0.01673	0.02780	0.06357	0.00047	0.00003
28. Basic chemical products, petroleum and coal products	0.06159	0.00000	0.00000	0.00000	0.00000
29. Paints, cleaning compounds and other chemical products	0.04264	0.27456	0.27717	0.01171	0.00324
30. Non-metallic mineral products	0.00718	0.19092	0.44100	0.00137	0.00060
31. Basic metal industries	0.04256	0.00000	0.00000	0.00000	0.00000
32. Structural metal products	0.00094	0.34640	0.34096	0.00033	0.00011
33. Other fabricated metal products, excl. machinery and equipment	0.02853	0.24490	0.36738	0.00699	0.00257
34. Agricultural machinery and equipment	0.00017	0.03351	0.24082	0.00001	.00000
35. Other machinery, excl. electrical	0.09710	0.01046	0.31885	0.00102	0.00032
36. Electrical machinery, apparatus and supplies	0.01840	0.00208	0.29333	0.00004	0.00001
37. Radio and TV equipment and electrical appliances and housewares	0.00119	0.00000	0.00000	0.00000	0.00000
38. Motor vehicles	0.00000	0.00240	0.17857	0.00000	0.00000
39. Motor vehicle parts and accessories	0.00411	0.22395	0.44734	0.00092	0.00041
40. Other transport equipment	0.00468	0.00447	0.59494	0.00002	0.00001
41. Other manufacturing industries	0.00410	0.06315	0.33009	0.00026	0.00009
42. Electricity supply	0.09657	0.88769	0.39609	0.08572	0.03395
43. Water supply	0.00241	1.00000	0.34391	0.00241	0.00083
44. Building construction	0.00306	0.76957	0.15242	0.00235	0.00036
45. Civil engineering and other construction	0.00214	0.77461	0.34785	0.00166	0.00058
46. Wholesale and retail trade	0.08301	0.94899	0.55944	0.07878	0.04407
47. Transport	0.04921	0.78169	0.56161	0.03847	0.02160
48. Communication	0.01283	0.93322	0.45606	0.01197	0.00546
49. Other services	0.15122	0.71914	0.59695	0.10875	0.06492
TOTAL				1.39252	0.72760

aij = Inverse coefficients; gi = Local component of total supply; ∝i = Factor input coefficient.
SOURCE OF BASIC DATA: Table A.16.

TABLE S.6 – ESTIMATES OF VALUE ADDED DIRECTLY AND INDIRECTLY RESULTING FROM MINERAL PRODUCTION
R millions

YEAR	INTERMEDIATE INPUTS				INDIRECT VALUE ADDED 1)				DIRECT VALUE ADDED				TOTAL VALUE ADDED 2)
	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING	
1950	3.1	0.0	3.4	6.5	1.4	0.0	1.5	2.9	11.8	0.0	6.7	18.5	21.4
1951	2.6	0.0	3.2	5.8	1.2	0.0	1.4	2.6	17.7	0.0	13.5	31.2	33.8
1952	2.5	0.0	4.4	6.9	1.2	0.0	1.9	3.1	20.2	0.0	14.5	34.7	37.8
1953	3.5	0.0	5.6	9.1	1.6	0.0	2.5	4.1	20.2	0.0	15.0	35.2	39.3
1954	4.3	0.0	4.8	9.1	2.0	0.0	2.1	4.1	22.8	0.0	14.2	37.0	41.1
1955	8.2	0.0	2.6	10.8	3.8	0.0	1.1	5.0	27.4	0.0	25.1	52.5	57.5
1956	7.3	0.0	5.0	12.3	3.4	0.0	2.2	5.6	33.3	0.0	30.3	63.6	69.2
1957	8.8	0.0	5.1	13.9	4.1	0.0	2.2	6.3	31.5	0.0	23.1	54.6	60.9
1958	7.4	0.0	4.5	11.9	3.4	0.0	2.0	5.4	26.7	0.0	19.6	46.3	51.7
1959	8.3	0.0	7.4	15.7	3.9	0.0	3.3	7.1	28.1	0.0	23.1	51.2	58.3
1960	6.9	0.0	3.9	10.8	3.2	0.0	1.7	4.9	27.8	0.0	15.4	43.2	48.1
1961	4.7	0.0	3.0	7.7	2.2	0.0	1.3	3.5	32.2	0.0	14.9	47.1	50.6
1962	8.3	0.0	6.1	14.4	3.9	0.0	2.7	6.5	32.1	0.0	19.4	51.5	58.0
1963	2.8	0.0	4.1	6.9	1.3	0.0	1.8	3.1	42.8	0.0	19.3	62.1	65.2
1964	6.1	0.0	4.4	10.5	2.8	0.0	1.9	4.8	57.8	0.0	31.8	89.6	94.4
1965	12.3	0.0	5.6	17.9	5.7	0.0	2.5	8.2	64.7	0.0	35.7	100.4	108.6
1966	12.1	0.0	8.6	20.7	5.6	0.0	3.8	9.4	84.0	0.0	41.8	125.8	135.2
1967	7.7	0.0	4.0	11.7	3.6	0.0	1.8	5.3	85.4	0.0	39.1	124.5	129.8
1968	12.3	0.0	6.3	18.6	5.7	0.0	2.8	8.5	79.2	0.0	45.9	125.1	133.6
1969	14.3	0.0	8.7	23.0	6.6	0.0	3.8	10.5	81.4	0.0	45.7	127.1	137.6
1970	15.3	0.0	9.3	24.6	7.1	0.0	4.1	11.2	59.6	0.0	50.8	110.4	121.6
1971	7.8	0.0	17.4	25.2	3.6	0.0	7.7	11.3	57.2	0.0	35.2	92.4	103.7
1972	7.4	0.0	26.5	33.9	3.4	0.0	11.7	15.1	90.9	0.0	31.9	122.8	137.9
1973	2.6	0.4	34.6	37.6	1.2	0.2	15.2	16.6	155.1	-0.4	47.3	202.0	218.6
1974	28.5	0.5	40.1	69.1	13.3	0.2	17.6	31.1	116.1	-0.4	68.1	183.8	214.9
1975	19.4	0.5	47.5	67.4	9.0	0.2	20.9	30.1	135.2	2.4	50.2	187.8	217.9
1976	32.9	22.4	54.1	109.4	15.3	9.1	23.8	48.2	170.8	9.4	58.0	238.2	286.4
1977	82.7	70.5	50.6	203.8	38.5	28.6	22.3	89.3	293.9	48.0	68.6	410.5	499.8
1978	22.0	67.7	46.5	136.2	10.2	27.4	20.5	58.1	439.2	66.9	76.2	582.3	640.4
1979	44.2	93.6	79.5	217.3	20.6	37.9	35.0	93.4	393.3	140.8	99.4	633.5	726.9
1980	44.5	119.3	89.4	253.2	20.7	48.3	39.3	108.3	414.4	170.8	96.7	681.9	790.2
1981	40.6	116.7	80.8	238.1	18.9	47.3	35.6	101.7	210.6	190.4	80.6	481.6	583.3
1982	45.6	126.0	91.3	262.9	21.2	51.0	40.2	112.4	165.6	246.2	79.3	491.1	603.5
1983	25.0	112.2	88.7	225.9	11.6	45.4	39.0	96.1	201.2	193.0	109.3	503.5	599.6
1984	54.6	197.3	95.1	347.0	25.4	79.9	41.8	147.1	178.9	247.4	110.5	536.8	683.9
1985	28.0	190.6	151.6	370.2	13.0	77.2	66.7	156.9	372.2	457.1	125.0	954.3	1111.2

1) Intermediate inputs multiplied by coefficients: Diamond mining: 0.465
Uranium mining: 0.405
Other mining: 0.440

2) Measured at market prices.

SOURCE OF BASIC DATA: Tables S.3 to S.5, Figures 3.6 to 3.8 and Table A.15.

APPENDIX THREE

MULTIPLIER CALCULATIONS B

THE ESTIMATION OF THE COEFFICIENT OF INDUSTRIAL INTERMEDIATION (λ) AND THE WEIGHTED AVERAGE OF INDUSTRIAL VALUE ADDED (γ) OF MINING'S CAPITAL OUTLAYS

The same calculations as those described in detail in appendix two are made here to determine the backward linkages and multiplier of industries responsible for the production of capital goods for the mining industry. The detailed calculations for each sector are not presented here, owing to the voluminous nature of the data. The summaries of the final calculations, however, are presented in tables S.7 to S.9.

TABLE S.7 - COEFFICIENTS USED IN CALCULATING BACKWARD MULTIPLIER EFFECTS OF INDUSTRIES PRODUCING CAPITAL GOODS

SECTOR/INDUSTRY/PRODUCT	aij	gi	αi	aij.gi.αi	aij.αj.(1-gj)	MULTI-PLIER*	ADJUSTED MULTI-PLIER#
SECTOR44 Building construction ...	1.23696	0.76957	0.15242	0.42896	0.04344	0.47240	0.36355
SECTOR45 Civil engineering & other construction	1.11009	0.77461	0.34785	0.56273	0.08703	0.64977	0.50332
SECTOR38 Motor vehicles	1.01818	0.00240	0.17857	0.26118	0.18138	0.44256	0.00106
SECTOR40 Other transport equipment	1.09170	0.00447	0.59494	0.12985	0.64659	0.77644	0.00347
SECTOR22 Wood, wood products & furniture	1.27414	0.15497	0.37407	0.31178	0.40276	0.71454	0.11073
SECTOR27 Rubber products	1.01325	0.02780	0.06357	0.37053	0.06262	0.43315	0.01204
SECTOR32 Structural metal products	1.09082	0.34640	0.34096	0.23918	0.24309	0.48227	0.16706
SECTOR33 Other fabricated metal products	1.05161	0.24490	0.36738	0.21099	0.29173	0.50272	0.12312
SECTOR35 Other machinery, excl. electrical machinery ..	1.10181	0.01046	0.31885	0.20272	0.34764	0.55036	0.00576
SECTOR36 Electrical machinery	1.07370	0.00208	0.29333	0.15975	0.31429	0.47404	0.00099
SECTOR37 Electrical appliances ...	1.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
SECTOR41 Other manufacturing industries	1.01691	0.06315	0.33009	0.61657	0.31447	0.93104	0.05880
SECTOR46 Wholesale & retail trade	1.12187	0.94899	0.55944	0.77998	0.03201	0.81200	0.77058
SECTOR47 Transport	1.14187	0.78169	0.56161	0.62253	0.14000	0.76253	0.59606
SECTOR49 Other services	1.19863	0.71914	0.59695	0.65407	0.20096	0.85504	0.61489

NOTES: aij = Inverse coefficients; gi = Local component of total supply; αi = Factor input coefficient;

* = aij.gi.αi + aij.αj(1-gj); # = gj[aij.gi.αi + aij.(1-gj)]

SOURCE OF BASIC DATA: Tables A.16 and A.31.

TABLE S.8 - FIXED INVESTMENT IN MINING BY KIND OF INDUSTRIES PRODUCING CAPITAL GOODS - R ' 000

INDUSTRY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
SECTOR 44 Building construction ...	1,800	810	1,170	2,520	19,080	63,180	30,960	19,530	30,060	10,350	27,990	20,430	11,070	4,860	3,870	1,607
SECTOR 45 Civil engineering & other construction	3,910	1,650	2,750	1,100	3,238	6,049	6,965	2,750	6,293	2,811	5,621	4,888	3,666	7,576	7,332	4,840
SECTOR 38 Motor vehicles	79	79	158	316	5,053	3,237	8,449	4,974	8,133	5,606	6,080	7,896	3,790	2,843	2,280	4,559
SECTOR 40 Other transport equipment	21	21	42	84	1,347	863	2,251	1,326	2,167	1,494	1,620	2,104	1,010	757	1,174	2,348
SECTOR 22 Wood, wood products & furniture	6	3	6	14	31	48	52	50	44	32	71	39	28	25	17	19
SECTOR 27 Rubber products	58	31	58	129	278	431	464	452	392	290	640	354	253	223	155	167
SECTOR 32 Structural metal products	766	406	765	1,685	3,644	5,649	6,086	5,926	5,139	3,804	8,388	4,635	3,312	2,922	2,035	2,194
SECTOR 33 Other fabricated metal products	610	323	609	1,342	2,903	4,500	4,848	4,721	4,093	3,031	6,682	3,693	2,638	2,328	1,621	1,748
SECTOR 35 Other machinery, excl. electrical machinery ..	2,622	1,390	2,618	5,769	12,476	19,340	20,836	20,289	17,593	13,025	28,720	15,870	11,338	10,004	6,967	7,513
SECTOR 36 Electrical machinery	688	365	687	1,514	3,273	5,074	5,467	5,323	4,616	3,417	7,535	4,164	2,975	2,625	1,828	1,971
SECTOR 37 Electrical appliances ...	519	275	518	1,142	2,471	3,830	4,126	4,018	3,484	2,579	5,687	3,143	2,245	1,981	1,380	1,488
SECTOR 41 Other manufacturing industries	208	110	207	457	988	1,532	1,650	1,607	1,393	1,032	2,275	1,257	898	792	552	595
SECTOR 46 Wholesale & retail trade	824	437	823	1,814	3,922	6,080	6,550	6,378	5,530	4,094	9,028	4,989	3,564	3,145	2,190	2,362
SECTOR 47 Transport	52	28	52	114	247	383	413	402	348	258	569	314	225	198	138	149
SECTOR 49 Other services	137	72	137	300	649	1,004	1,083	1,054	915	677	1,494	824	588	521	361	391
TOTAL FIXED INVESTMENT	12,300	6,000	10,600	18,300	59,600	121,200	100,200	78,800	90,200	52,500	112,400	74,600	47,600	40,800	31,900	31,951

SOURCE OF BASIC DATA: Tables A.16 and A.31.

TABLE S.9 – VALUE ADDED DIRECTLY AND INDIRECTLY BY KIND OF INDUSTRIES PRODUCING CAPITAL GOODS – R ' 000

INDUSTRY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
SECTOR 44 Building construction ...	654	294	425	916	6,936	22,969	11,255	7,100	10,928	3,763	10,176	7,427	4,024	1,767	1,407	584
SECTOR 45 Civil engineering & other construction	1,968	830	1,384	554	1,630	3,045	3,506	1,384	3,167	1,415	2,829	2,460	1,845	3,813	3,690	2,436
SECTOR 38 Motor vehicles	0	0	0	0	5	3	9	5	9	6	6	8	4	3	2	5
SECTOR 40 Other transport equipment	0	0	0	0	5	3	8	5	8	5	6	7	4	3	4	8
SECTOR 22 Wood, wood products & & furniture	1	0	1	2	3	5	6	6	5	4	8	4	3	3	2	2
SECTOR 27 Rubber products	1	0	1	2	3	5	6	5	5	3	8	4	3	3	2	2
SECTOR 32 Structural metal products	128	68	128	281	609	944	1,017	990	859	635	1,401	774	553	488	340	367
SECTOR 33 Other fabricated metal products	75	40	75	165	357	554	597	581	504	373	823	455	325	287	200	215
SECTOR 35 Other machinery, excl. electrical machinery ..	15	8	15	33	72	111	120	117	101	75	165	91	65	58	40	43
SECTOR 36 Electrical machinery	1	0	1	1	3	5	5	5	5	3	7	4	3	3	2	2
SECTOR 37 Electrical appliances ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SECTOR 41 Other manufacturing industries	12	6	12	27	58	90	97	94	82	61	134	74	53	47	32	35
SECTOR 46 Wholesale & retail trade	635	337	634	1,398	3,022	4,685	5,047	4,915	4,261	3,155	6,957	3,844	2,746	2,423	1,688	1,820
SECTOR 47 Transport	31	17	31	68	147	228	246	240	207	154	339	187	134	118	82	89
SECTOR 49 Other services	84	44	84	184	399	617	666	648	563	416	919	507	362	320	222	240
TOTAL VALUE ADDED	3,605	1,646	2,791	3,632	13,251	33,265	22,584	16,095	20,703	10,068	23,777	15,848	10,124	9,334	7,713	5,849

SOURCE: Applying coefficients of table S.7 to the value of production in table S.8.

APPENDIX FOUR

LINEAR REGRESSION CALCULATIONS

THE ESTIMATION OF THE EXPENDITURE MULTIPLIER

The formulae used for the three linear regression equations in calculating the expenditure multiplier are as follows:

1. $S = a + s.Y$, where
S = net private domestic saving, i.e. net domestic savings minus current surplus of the general government = personal and corporate saving,
Y = net domestic income at market prices.

Calculations of a, s and correlation coefficient (r):

$$s = \frac{\Sigma YS - \frac{\Sigma Y \Sigma S}{n}}{\Sigma Y^2 - \frac{(\Sigma Y)^2}{n}} \text{ = marginal saving propensity}$$

$a = \bar{S} - s.\bar{Y}$, where

$\bar{S} = \Sigma S \,/\, n$,

$\bar{Y} = \Sigma Y \,/\, n$, and

n = number of observations

$$r = \sqrt[2]{\frac{\left[\Sigma YS - \frac{\Sigma Y \Sigma S}{n}\right]^2}{\left[\Sigma Y - \frac{(\Sigma Y)^2}{n}\right]\left[\Sigma S - \frac{(\Sigma S)^2}{n}\right]}}$$

2. $T = b + t.Y$, where
T = direct and indirect taxes, and
Y = net domestic product at market prices.

Calculation of b, t and correlation coefficient (r):

$$t = \frac{\Sigma YT - \frac{\Sigma Y \Sigma T}{n}}{\Sigma Y^2 - \frac{(\Sigma Y)^2}{n}} \text{ = marginal propensity to pay taxes}$$

$b = \bar{T} - t.\bar{Y}$, where

$\bar{T} = \Sigma\, T \,/\, n,$

$\bar{Y} = \Sigma\, Y \,/\, n,$ and

n = number of observations

$$r = \sqrt[2]{\frac{\left[\Sigma\, YT - \frac{\Sigma\, Y \Sigma\, T}{n}\right]^2}{\left[\Sigma\, Y - \frac{(\Sigma\, Y)^2}{n}\right]\left[\Sigma\, T - \frac{(\Sigma\, T)^2}{n}\right]}}$$

3. $Z = c + z.Y$, where
Z = imports of goods and non-factor services, and
Y = net domestic product at market prices.

Calculations of c, z and correlation coefficients (r):

$$z = \frac{\Sigma\, YZ - \frac{\Sigma\, Y \Sigma\, Z}{n}}{\Sigma\, Y^2 - \frac{(\Sigma\, Y)^2}{n}} = \text{marginal import propensity}$$

$c = \bar{Z} - z.\bar{Y}$, where

$\bar{Z} = \Sigma\, Z \,/\, n,$

$\bar{Y} = \Sigma\, Y \,/\, n,$ and

n = number of observations

$$r = \sqrt[2]{\frac{\left[\Sigma\, YZ - \frac{\Sigma\, Y \Sigma\, Z}{n}\right]^2}{\left[\Sigma\, Y - \frac{(\Sigma\, Y)^2}{n}\right]\left[\Sigma\, Z - \frac{(\Sigma\, Z)^2}{n}\right]}}$$

These formulae are applied to the three pairs of variables for the period 1970 to 1985. The results of these calculations appear in table S.10.

TABLE S.10 - DATA USED IN CALCULATING THE AGGREGATE DOMESTIC EXPENDITURE MULTIPLIER

YEAR	SAVINGS PROPENSITY			TAX PROPENSITY			IMPORT PROPENSITY		
	Y	S	S*	Y	T	T*	Y	Z	Z*
1970	331.4	59.1	84.6	331.4	82.8	81.3	331.4	171.2	227.3
1971	337.8	29.3	85.2	337.8	88.8	82.6	337.8	228.6	231.7
1972	405.3	103.9	91.9	405.3	71.5	96.7	405.3	242.6	277.6
1973	534.9	160.8	104.8	534.9	108.4	123.7	534.9	249.7	365.8
1974	565.7	83.3	107.8	565.7	149.0	130.1	565.7	389.7	386.7
1975	639.7	111.2	115.2	639.7	141.0	145.5	639.7	502.2	437.1
1976	764.8	106.2	127.6	764.8	160.0	171.5	764.8	557.4	522.2
1977	958.8	176.8	146.8	958.8	195.4	211.9	958.8	665.9	654.2
1978	1162.5	191.4	167.0	1162.5	316.2	254.4	1162.5	614.3	792.8
1979	1304.1	216.4	181.0	1304.1	359.7	283.9	1304.1	754.3	889.2
1980	1431.2	241.6	193.6	1431.2	374.4	310.3	1431.2	1050.9	975.7
1981	1452.5	216.6	195.8	1452.5	254.5	314.8	1452.5	1237.9	990.2
1982	1661.7	176.5	216.5	1661.7	291.9	358.3	1661.7	1331.5	1132.5
1983	1734.4	249.5	223.7	1734.4	311.5	373.5	1734.4	1257.9	1182.0
1984	1960.5	159.4	246.1	1960.5	437.7	420.5	1960.5	1400.7	1335.9
1985	2596.0	314.9	309.1	2596.0	569.0	552.9	2596.0	1514.5	1768.3

Savings propensity

Where: Y = Net domestic income at market prices.
S = Net private domestic saving.

S* = a + s(Y)

Where: a = 51.749
s = 0.099
r = 0.857

Tax propensity

Y = Net domestic income at market prices.
T = Direct and indirect taxes.

T* = b + t(Y)

b = 12.276
t = 0.208
r = 0.955

Import propensity

Y = Net domestic income at market prices.
Z = Imports of goods and non-factor services.

Z* = c + z(Y)

c = 1.813
z = 0.680
r = 0.961

AGGREGATE EXPENDITURE MULTIPLIER = 1/(s+t+z+st) = 1/[0.099+0.208+0.68-(0.099x0.208)]

= 1.034

SOURCE OF BASIC DATA: Department of Finance (1986a: 19-24).

APPENDIX FIVE

MULTIPLIER CALCULATIONS C

THE ESTIMATION OF THE EMPLOYMENT MULTIPLIER

Using the inverse input coefficients (a_{ij}) and the coefficients of the local content of total output (g_i) as basis, the employment multiplier may be established. Further estimates of the employment / output ratio's (n_i) are needed for these calculations. Employment data were used from table A.34 in the statistical appendix, and where data of the individual industries' employment were not available, employment in the sectors was divided into industries, using remuneration of employees as basis. Output data were taken from the input-output table, shown in table A.16 in the statistical appendix.

Estimates of the employment multipliers for the three mining industries are presented in tables S.11 to S.13. The method of derivation of the multiplier is self-explanatory, given the background from appendix two. How a R100 million increase in mineral output leads to additional employment is explained in table S.14.

TABLE S.11 - EMPLOYMENT MULTIPLIER FOR DIAMOND MINING, 1980

INDUSTRY	EMPLOY-MENT	OUTPUT R'000	ni (1)/(2)	aij.gi	aij.gi.ni (4)x(3)
	(1)	(2)	(3)	(4)	(5)
1. Cattle farming	102,870	103,237	0.99645	0.00137	0.00136
2. Sheep and goat farming	48,900	54,800	0.89234	0.00130	0.00116
3. Other agriculture and forestry	16,020	16,673	0.96083	0.00078	0.00075
4. Fishing	1,738	15,770	0.11021	0.00004	.00000
5. Diamond mining	7,053	458,925	0.01537	0.99901	0.01535
6. Coal mining	0	0	0.00000	0.00000	0.00000
7. Uranium mining	3,143	290,080	0.01083	0.00000	0.00000
8. Other mining	9,987	185,337	0.05389	0.00032	0.00002
9. Meat processing	2,302	84,120	0.02737	0.00043	0.00001
10. Dairy products	168	9,186	0.01829	0.00017	.00000
11. Fish processing	1,113	12,469	0.08926	0.00009	0.00001
12. Vegetable and animal oils and fats	48	4,808	0.00998	0.00014	.00000
13. Grain mill products	22	13,622	0.00162	0.00007	.00000
14. Bakery products	668	11,974	0.05579	0.00003	.00000
15. Other food products	110	1,640	0.06707	0.00001	.00000
16. Prepared animal feeds	67	3,727	0.01798	0.00010	.00000
17. Malt liquors and malt	722	22,190	0.03254	0.00017	0.00001
18. Other beverages and tobacco	128	4,330	0.02956	0.00004	.00000
19. Textiles, excl. clothing	49	2,105	0.02328	0.00021	.00000
20. Clothing	62	1,956	0.03170	0.00003	.00000
21. Tanneries, leather products and footwear	67	3,284	0.02040	0.00005	.00000
22. Wood, wood products and furniture	261	3,494	0.07470	0.00017	0.00001
23. Pulp, paper and paper products	1	15	0.06667	.00000	.00000
24. Printing and publishing	850	6,796	0.12507	0.00058	0.00007
25. Fertilisers and pesticides	0	0	0.00000	0.00000	0.00000
26. Plastic materials and man-made fibres	39	563	0.06927	0.00015	0.00001
27. Rubber products	44	409	0.10758	0.00013	0.00001
28. Basic chemical products, petroleum and coal products	0	0	0.00000	0.00000	0.00000
29. Paints, cleaning compounds and other chemical products	500	17,307	0.02889	0.00153	0.00004
30. Non-metallic mineral products	759	7,771	0.09767	0.00023	0.00002
31. Basic metal industries	0	0	0.00000	0.00000	0.00000
32. Structural metal products	1,289	13,820	0.09327	0.00009	0.00001
33. Other fabricated metal products, excl. machinery and equipment	507	11,808	0.04294	0.00160	0.00007
34. Agricultural machinery and equipment	6	245	0.02449	.00000	.00000
35. Other machinery, excl. electrical	92	1,358	0.06775	0.00017	0.00001
36. Electrical machinery, apparatus and supplies	7	75	0.09333	0.00001	.00000
37. Radio and TV equipment and electrical appliances and housewares	0	0	0.00000	0.00000	0.00000
38. Motor vehicles	4	112	0.03571	0.00000	0.00000
39. Motor vehicle parts and accessories	332	4,339	0.07652	0.00021	0.00002
40. Other transport equipment	26	158	0.16456	.00000	.00000
41. Other manufacturing industries	30	1,439	0.02085	0.00008	.00000
42. Electricity supply	1,757	62,072	0.02831	0.02059	0.00058
43. Water supply	129	6,144	0.02100	0.00061	0.00001
44. Building construction	3,484	117,704	0.02960	0.00042	0.00001
45. Civil engineering and other construction	5,884	95,473	0.06163	0.00035	0.00002
46. Wholesale and retail trade	19,359	299,198	0.06470	0.01776	0.00115
47. Transport	10,197	118,889	0.08577	0.00719	0.00062
48. Communication	1,557	23,451	0.06639	0.00334	0.00022
49. Other services	67,621	202,771	0.33348	0.02963	0.00988
TOTAL	309,972	2,295,644			0.03147

SOURCE OF BASIC DATA: Tables A.16, A.34 and S.3.

TABLE S.12 - EMPLOYMENT MULTIPLIER FOR URANIUM MINING, 1980

INDUSTRY	EMPLOY-MENT	OUTPUT R'000	ni (1)/(2)	aij.gi	aij.gi.ni (4)x(3)
	(1)	(2)	(3)	(4)	(5)
1. Cattle farming	102,870	103,237	0.99645	0.00117	0.00116
2. Sheep and goat farming	48,900	54,800	0.89234	0.00615	0.00549
3. Other agriculture and forestry	16,020	16,673	0.96083	0.00168	0.00161
4. Fishing	1,738	15,770	0.11021	0.00009	0.00001
5. Diamond mining	7,053	458,925	0.01537	0.00342	0.00005
6. Coal mining	0	0	0.00000	0.00000	0.00000
7. Uranium mining	3,143	290,080	0.01083	1.00000	0.01083
8. Other mining	9,987	185,337	0.05389	0.00895	0.00048
9. Meat processing	2,302	84,120	0.02737	0.00140	0.00004
10. Dairy products	168	9,186	0.01829	0.00057	0.00001
11. Fish processing	1,113	12,469	0.08926	0.00025	0.00002
12. Vegetable and animal oils and fats	48	4,808	0.00998	0.00085	0.00001
13. Grain mill products	22	13,622	0.00162	0.00032	.00000
14. Bakery products	668	11,974	0.05579	0.00008	.00000
15. Other food products	110	1,640	0.06707	0.00004	.00000
16. Prepared animal feeds	67	3,727	0.01798	0.00028	0.00001
17. Malt liquors and malt	722	22,190	0.03254	0.00054	0.00002
18. Other beverages and tobacco	128	4,330	0.02956	0.00008	.00000
19. Textiles, excl. clothing	49	2,105	0.02328	0.00125	0.00003
20. Clothing	62	1,956	0.03170	0.00024	0.00001
21. Tanneries, leather products and footwear	67	3,284	0.02040	0.00015	.00000
22. Wood, wood products and furniture	261	3,494	0.07470	0.00060	0.00004
23. Pulp, paper and paper products	1	15	0.06667	0.00001	.00000
24. Printing and publishing	850	6,796	0.12507	0.00217	0.00027
25. Fertilisers and pesticides	0	0	0.00000	0.00000	0.00000
26. Plastic materials and man-made fibres	39	563	0.06927	0.00069	0.00005
27. Rubber products	44	409	0.10758	0.00033	0.00003
28. Basic chemical products, petroleum and coal products	0	0	0.00000	0.00000	0.00000
29. Paints, cleaning compounds and other chemical products	500	17,307	0.02889	0.01105	0.00032
30. Non-metallic mineral products	759	7,771	0.09767	0.00137	0.00013
31. Basic metal industries	0	0	0.00000	0.00000	0.00000
32. Structural metal products	1,289	13,820	0.09327	0.00043	0.00004
33. Other fabricated metal products, excl. machinery and equipment	507	11,808	0.04294	0.01107	0.00048
34. Agricultural machinery and equipment	6	245	0.02449	.00000	.00000
35. Other machinery, excl. electrical	92	1,358	0.06775	0.00077	0.00005
36. Electrical machinery, apparatus and supplies	7	75	0.09333	0.00005	.00000
37. Radio and TV equipment and electrical appliances and housewares	0	0	0.00000	0.00000	0.00000
38. Motor vehicles	4	112	0.03571	0.00000	0.00000
39. Motor vehicle parts and accessories	332	4,339	0.07652	0.00079	0.00006
40. Other transport equipment	26	158	0.16456	0.00006	0.00001
41. Other manufacturing industries	30	1,439	0.02085	0.00042	0.00001
42. Electricity supply	1,757	62,072	0.02831	0.05050	0.00143
43. Water supply	129	6,144	0.02100	0.00274	0.00006
44. Building construction	3,484	117,704	0.02960	0.00148	0.00004
45. Civil engineering and other construction	5,884	95,473	0.06163	0.00132	0.00008
46. Wholesale and retail trade	19,359	299,198	0.06470	0.05467	0.00354
47. Transport	10,197	118,889	0.08577	0.03127	0.00268
48. Communication	1,557	23,451	0.06639	0.00985	0.00065
49. Other services	67,621	202,771	0.33348	0.11237	0.03747
TOTAL	309,972	2,295,644			0.06726

SOURCE OF BASIC DATA: Tables A.16, A.34 and S.4.

TABLE S.13 - EMPLOYMENT MULTIPLIER FOR OTHER MINING, 1980

INDUSTRY	EMPLOY-MENT	OUTPUT R'000	ni (1)/(2)	aij.gi	aij.gi.ni (4)x(3)
	(1)	(2)	(3)	(4)	(5)
1. Cattle farming	102,870	103,237	0.99645	0.00603	0.00601
2. Sheep and goat farming	48,900	54,800	0.89234	0.00605	0.00540
3. Other agriculture and forestry	16,020	16,673	0.96083	0.00208	0.00200
4. Fishing	1,738	15,770	0.11021	0.00012	0.00001
5. Diamond mining	7,053	458,925	0.01537	0.00211	0.00003
6. Coal mining	0	0	0.00000	0.00000	0.00000
7. Uranium mining	3,143	290,080	0.01083	0.00000	0.00000
8. Other mining	9,987	185,337	0.05389	1.01252	0.05456
9. Meat processing	2,302	84,120	0.02737	0.00161	0.00004
10. Dairy products	168	9,186	0.01829	0.00072	0.00001
11. Fish processing	1,113	12,469	0.08926	0.00034	0.00003
12. Vegetable and animal oils and fats	48	4,808	0.00998	0.00085	0.00001
13. Grain mill products	22	13,622	0.00162	0.00038	.00000
14. Bakery products	668	11,974	0.05579	0.00010	0.00001
15. Other food products	110	1,640	0.06707	0.00005	.00000
16. Prepared animal feeds	67	3,727	0.01798	0.00040	0.00001
17. Malt liquors and malt	722	22,190	0.03254	0.00077	0.00002
18. Other beverages and tobacco	128	4,330	0.02956	0.00012	.00000
19. Textiles, excl. clothing	49	2,105	0.02328	0.00101	0.00002
20. Clothing	62	1,956	0.03170	0.00014	.00000
21. Tanneries, leather products and footwear	67	3,284	0.02040	0.00013	.00000
22. Wood, wood products and furniture	261	3,494	0.07470	0.00061	0.00005
23. Pulp, paper and paper products	1	15	0.06667	0.00001	.00000
24. Printing and publishing	850	6,796	0.12507	0.00245	0.00031
25. Fertilisers and pesticides	0	0	0.00000	0.00000	0.00000
26. Plastic materials and man-made fibres	39	563	0.06927	0.00070	0.00005
27. Rubber products	44	409	0.10758	0.00047	0.00005
28. Basic chemical products, petroleum and coal products	0	0	0.00000	0.00000	0.00000
29. Paints, cleaning compounds and other chemical products	500	17,307	0.02889	0.01171	0.00034
30. Non-metallic mineral products	759	7,771	0.09767	0.00137	0.00013
31. Basic metal industries	0	0	0.00000	0.00000	0.00000
32. Structural metal products	1,289	13,820	0.09327	0.00033	0.00003
33. Other fabricated metal products, excl. machinery and equipment	507	11,808	0.04294	0.00699	0.00030
34. Agricultural machinery and equipment	6	245	0.02449	0.00001	.00000
35. Other machinery, excl. electrical	92	1,358	0.06775	0.00102	0.00007
36. Electrical machinery, apparatus and supplies	7	75	0.09333	0.00004	.00000
37. Radio and TV equipment and electrical appliances and housewares	0	0	0.00000	0.00000	0.00000
38. Motor vehicles	4	112	0.03571	0.00000	0.00000
39. Motor vehicle parts and accessories	332	4,339	0.07652	0.00092	0.00007
40. Other transport equipment	26	158	0.16456	0.00002	.00000
41. Other manufacturing industries	30	1,439	0.02085	0.00026	0.00001
42. Electricity supply	1,757	62,072	0.02831	0.08572	0.00243
43. Water supply	129	6,144	0.02100	0.00241	0.00005
44. Building construction	3,484	117,704	0.02960	0.00235	0.00007
45. Civil engineering and other construction	5,884	95,473	0.06163	0.00166	0.00010
46. Wholesale and retail trade	19,359	299,198	0.06470	0.07878	0.00510
47. Transport	10,197	118,889	0.08577	0.03847	0.00330
48. Communication	1,557	23,451	0.06639	0.01197	0.00079
49. Other services	67,621	202,771	0.33348	0.10875	0.03627
TOTAL	309,972	2,295,644			0.11770

SOURCE OF BASIC DATA: Tables A.16, A.34 and S.5.

TABLE S.14 - DATA USED IN CALCULATING THE EMPLOYMENT MULTIPLIER OF MINING, 1980.

COUNTRY	TOTAL OUTPUT 1980 * (R'000)	TOTAL OUTPUT = R100 m (R'000)	EMPLOYMENT MULTIPLIER #	EMPLOYMENT GENERATED (Number)
	(A)	(B)	(C)	(B)x(C)
TOTAL EMPLOYMENT:				
DIAMOND MINING	458,925	49,118	0.03147	1,546
URANIUM MINING	290,080	31,046	0.06725	2,088
OTHER MINING	185,337	19,836	0.11769	2,334
TOTAL MINING	934,342	100,000		
TOTAL EMPLOYMENT				5,968
MINING EMPLOYMENT:				
DIAMOND MINING	458,925	49,118	0.01535	754
URANIUM MINING	290,080	31,046	0.01083	336
OTHER MINING	185,337	19,836	0.05456	1,082
TOTAL MINING	934,342	100,000		
MINING EMPLOYMENT				2,172
EMPLOYMENT IN OTHER INDUSTRIES				3,796

SOURCE OF BASIC DATA: * From table A.16. # From Tables S.11 to S.13.

STATISTICAL APPENDIX

STATISTICAL APPENDIX

SOURCES OF AND NOTES TO STATISTICAL TABLES IN STATISTICAL APPENDIX

GENERAL NOTES:

If the source of a table is given as "Unpublished information from the Department of Finance", it refers to data obtained from the department's economic and financial planning division in which the author was an economic researcher while writing this thesis. In addition, use was also made of unpublished information provided to the Department of Finance by various organisations, such as the Diamond Board, the Central Statistical Services (abbreviated CSS hereinafter) and the South African Reserve Bank.

Because the data in the statistical tables were computer processed and printed, a decimal point (.) is shown instead of a decimal comma (,), e.g. 123.4. Commas, on the other hand, are shown in certain tables to separate thousands, e.g. 1,000,000.

Owing to the independent rounding of data in some tables, the totals may not always add up to the figures shown.

NOTES TO INDIVIDUAL TABLES:

1. GROSS DOMESTIC PRODUCT BY TYPE OF ECONOMIC ACTIVITY AT CURRENT PRICES:

Source: 1970 to 1985: Department of Finance, 1986a: 12; prior to 1970: unpublished information from the Department of Finance.
Note: The data excludes value added in the enclave of Walvis Bay. The data also excludes value added resulting from subsistence agriculture and similar activities. The period prior to 1980 excludes the value added by the local police and armed forces, and the period after that includes this.

1a. COMPOSITION OF GROSS DOMESTIC PRODUCT AT CURRENT PRICES:

Source of basic data: Table A.1

2. GROSS DOMESTIC PRODUCT AT CONSTANT 1975 PRICES, ANNUAL GROWTH RATES AND TREND CYCLES:

Source of basic data: Unpublished information from the Department of Finance.
Note: The same as for table A.1. The deflating techniques used are: the double deflating method for agriculture; extrapolation from base year-GVA by means of volume indices for mining and fishing and deflating GVA-data by means of appropriate RSA deflators for all the other sectors.

3. POPULATION GROWTH AND PER CAPITA INCOME:

Source: GDP-data: Table A.2. Population data: 1951 (CSS, 1951); 1960 (CSS, 1960); 1970 (CSS, 1978); 1981 (Directorate of Development Co-ordination, 1985a); data for the other years were obtained by means of inter- and extrapolation.

4. THE URBAN POPULATION OF SWA/NAMIBIA:

Source: Official population census data for 1970 (CSS, 1978) and 1981 (Directorate of Development Co-ordination, 1985a).

Note: Data on urban population include only centres inhabited by more than 5000 people during 1981, except for Rundu and Katima Mulilo for which comparable data are not available for 1970.

5. CURRENT ACCOUNT OF THE BALANCE OF PAYMENTS:

Source of basic data: 1970 to 1985: Department of Finance, 1986a: 24; prior to 1970: unpublished information from the Department of Finance.

Note: Non-factor services are based on RSA "raising factors" from imports and exports.

6. MERCHANDISE EXPORTS BY TYPE OF PRODUCT:

Source of basic data: Unpublished data from the Department of Finance.

Note: The value of fish landed in Walvis Bay harbour is included as exports, but the subsequent export of processed fish is not. In addition, catches by foreign trawlers under jurisdiction of ICSEAF are not included in the value of unprocessed fish exports.

6a. COMPOSITION OF MERCHANDISE EXPORTS:

Source of basic data: Table A.6.

7. PHYSICAL VOLUME OF MINERAL PRODUCTION:

Source of basic data: Diamonds: unpublished information from the Diamond Board; uranium: unpublished information from the Department of Finance; other minerals: Department of Economic Affairs (1950 to 1984).

Note: Data excludes production by quarries.

8. GROSS VALUE OF MINERAL SALES AT CURRENT PRICES:

Source of basic data: As for table A.7.

Note: With certain minerals, particularly with semi-precious stones, the value of production was accepted as the value of sales, owing to incomplete sales statistics for some minerals.

9. SUMMARY OF GROSS VALUE OF MINERAL SALES:

Source of basic data: Table A.7.

10. SUMMARY OF GROSS VALUE OF MINERAL PRODUCTION AT CURRENT PRICES:

Source of basic data: Tables A.7 and A.8 with some further computations.

11. SUMMARY OF GROSS VALUE OF MINERAL PRODUCTION AT CONSTANT 1975 PRICES:

Source of basic data: Tables A.7 and A.8; data on 1975 unit prices of certain minerals obtained from the Geological Survey.

12. SUMMARY OF INDEX OF PHYSICAL VOLUME OF MINERAL PRODUCTION (1975=100):

Source of basic data: Tables A.11.

Note: A Laspeyres type base weighted volume index was used for these calculations.

13. INDEX OF PHYSICAL VOLUME OF DIAMOND PRODUCTION (1975=100):

Source of basic data: Table A.7 and Department of Economic Affairs (1950 to 1984).

14. INDEX OF PHYSICAL VOLUME OF PRODUCTION OF NON-FERROUS BASE METALS (1975=100):

Source of basic data: Table A.7.

Note: Copper/lead and tin/wolfram were divided into each respective mineral based on the average assay value; lead includes lead/vanadium and zinc includes zinc/lead.

15. MINING'S PRODUCTION ACCOUNTS:

Source of basic data: Unpublished information from the Department of Finance, the CSS and the S.A. Reserve Bank.

16. INPUT-OUTPUT TABLE AT BASIC VALUES - 1980:

Source of basic data: Input-output tables for 1978 of South Africa (Central Statistical Services, undated) and O'Connell (1974).

Note: Data of value added and final outputs were available. Where data of intermediate inputs were not available for certain industries, the same ratios as in South Africa were applied, leaving imports as the residual item. This method thus gives only a rough picture of the inter-industry transactions of SWA/Namibia. However, because of the similarity of the various industries in SWA/Namibia and those industries contained in the South African input-output tables (which, incidentally, are supposed to include SWA/Namibian industries), the results of this input-output table and the subsequent analyses are not so far-fetched as they would seem at first sight. Refer to Appendix 2 for a detailed discussion of the input-output table.

17. GROSS VALUE ADDED IN MINING AT CURRENT PRICES:

Source of basic data: Unpublished information from the Department of Finance; Planning division, SWA Administration (1977: 113); Odendaal-Commission (1964) and Krogh (1958).

18. GROSS VALUE ADDED IN MINING AT CONSTANT 1975 PRICES:

Source of basic data: Tables A.17 and A.12.

19. GROSS VALUE ADDED (GVA) IN MINING USING DIFFERENT DEFLATION TECHNIQUES:

Source of basic data: Tables A.17, A.18, A.39 and A.44.

20. COMPOSITION OF GROSS VALUE ADDED IN MINING AT CURRENT PRICES BY TYPE OF INDUSTRY:

Source of basic data: Table A.17.

21. CONTRIBUTION OF MINING TO GROSS DOMESTIC PRODUCT AT CURRENT PRICES:

Source of basic data: Table A.1 and A.17.

22. CONTRIBUTION OF MINING TO GROSS DOMESTIC PRODUCT AT CONSTANT 1975 PRICES:

Source of basic data: Table A.2 and A.18.

23. INPUTS IN THE MINING INDUSTRY - 1980:

24. OUTPUTS OF THE MINING INDUSTRY - 1980:

Source: Table A.16.

25. INPUT COEFFICIENTS OF THE MINING INDUSTRY; DIRECT REQUIREMENTS FROM OTHER INDUSTRIES PER RAND OF GROSS OUTPUT - 1980:

Source of basic data: Table A.23.

26. INVERSE INPUT COEFFICIENTS OF THE MINING INDUSTRY; TOTAL REQUIREMENTS FROM OTHER INDUSTRIES (DIRECT AND INDIRECT) PER RAND DELIVERY TO FINAL DEMAND FOR MINING PRODUCTS - 1980:

Source of basic data: Table A.16. The CSS assisted in the matrix inversion by means of appropriate computer programming. (Credit must go to Mr. H. Pryzibilski of the CSS).

27. VALUE ADDED DIRECTLY AND INDIRECTLY RESULTING FROM MINERAL PRODUCTION:

Source of basic data: Tables A.15; A.16; A.26 and S.6.

28. FIXED CAPITAL STOCK IN MINING AT CONSTANT 1975 PRICES:

Source of basic data: Unpublished information from the Department of Finance and the S.A. Reserve Bank.

29. GROSS FIXED INVESTMENT IN MINING AT CURRENT PRICES BY TYPE OF INDUSTRY:

Source: Unpublished information from the Department of Finance.

30. GROSS FIXED INVESTMENT IN MINING AT CONSTANT 1975 PRICES:

Source: Unpublished information from the Department of Finance.

31. GROSS FIXED INVESTMENT IN MINING AT CURRENT PRICES:

Source of basic data: Table A.29 and unpublished information from the Department of Finance.

32. CAPITAL/OUTPUT RATIO IN MINING:

Source of basic data: Tables A.18 and A.28.

33. INDICES OF FACTOR INPUTS IN MINING (1975=100):

Source of basic data: Tables A.28 and A.35.

34. ECONOMIC CLASSIFICATION OF ECONOMICALLY ACTIVE POPULATION OF SWA/ NAMIBIA:

Source: Official census data: 1951 (CSS, 1951); 1960 (CSS, 1960); 1970 (CSS, 1978) and 1981 (Directorate of Development Co-ordination, 1985a); the rest of the years are the author's own estimates based on *inter alia* Jones (1985: 2-8) and on various incidental statistical series.

35. EMPLOYMENT IN MINING:

Source of basic data: Department of Economic Affairs (1950 to 1984) and Chamber of Mines (1986: 22).

Note: Employment is measured as the average monthly labour.

36. INDICES OF EMPLOYMENT IN MINING:

Source of basic data: Table A.35.

37. SALARIES AND WAGES AND AVERAGE EARNINGS IN MINING:

Source of basic data: Table A.35; Department of Economic Affairs (1950 to 1984) and Chamber of Mines (1986: 22).

38. MINERAL OUTPUT PRICE INDICES (1975=100):

Source of basic data: Tables A.10 and A.11.

39. VALUE ADDED DEFLATORS OF MINING AND THE REST OF THE ECONOMY:

Source of basic data: Tables A.1, A.2 and A.18.

40. FOREIGN TRADE: INDICES OF VOLUME AND PRICES (1975=100):

Source of basic data: Export prices: Mining: Table A.38; Other exports: Unpublished information from the Department of Finance.

Export volumes: Mining: Tables A.6 and A.12; Other exports: Unpublished information from the Department of Finance.

Import prices: Using Laspeyres type base weighted price indices, based on the "import mix" during 1980 obtained from table A.16. South Africa's production price indices were used for this purpose (CSS, March 1985 to February 1986).

Import volumes: Value of imports at current prices (table A.5) deflated by import price index, described above.

41. PRICE INDICES OF INPUTS IN DIAMOND MINING (1975=100):

42. PRICE INDICES OF INPUTS IN URANIUM MINING (1975=100):

43. PRICE INDICES OF INPUTS IN OTHER MINING (EXCLUDING URANIUM MINING (1975=100):

Source of basic data: Using Laspeyres type base weighted price indices, based on mining's inputs during 1980, obtained from table A.16. South Africa's production price indices were used for the price indices of inputs (CSS, March 1985 to February 1986).

Note: Where no production price indices were available for certain sectors, e.g. trade and services, the GVA-deflators were taken as approximations of production price movements.

44. PRODUCTION ACCOUNTS AT CONSTANT 1975 PRICES:

Source of basic data: Tables A.15; A.38; A.41 to A.43 and unpublished information from the Department of Finance.

Note: Net indirect taxes of diamond mining were deflated by the index of diamond output prices (table A.38) and that of uranium and other mining by their respective input price indices (tables A.42 and A.43).

45. PRICE INDICES OF INPUTS AND OUTPUTS IN MINING (1975=100):

Source of basic data: Table A.44 and unpublished information from the Department of Finance.

46. MINING'S INCOME AND EXPENDITURE ACCOUNT:

Source of basic data: Table A.15; unpublished data from the Department of Finance, the CSS and the S.A. Reserve Bank.

47. SOURCE AND APPLICATION OF TOTAL INCOME OF MINING:

Source of basic data: Tables A.15 and A.46.

47(a) PERCENTAGE COMPOSITION OF SOURCE AND APPLICATION OF TOTAL INCOME OF MINING:

Source of basic data: Table A.47.

48. MINING'S CAPITAL FORMATION AND FINANCE ACCOUNT:

Source of basic data: Tables A.15, A.29 and A.46.

49. BUDGETED AND ACTUAL GOVERNMENT REVENUE FROM MINING:

Source of basic data: Original estimates and actual revenue from the Auditor-General's reports for the SWA Account (1969/70 to 1979/80) and for the accounts of the Central Authority (1980/81 to 1983/84). Data after 1983/84 form Department of Finance (1986a: 28).

50. CENTRAL GOVERNMENT REVENUE FROM MINING:

Source of basic data: Actual revenue from the Auditor-General's reports for the Accounts of the SWA Administration (1949/50 to 1968/69), for the SWA Account (1969/70 to 1979/80) and for the Accounts of the Central Authority (1980/81 to 1983/84); estimated and budgeted revenue

from Department of Finance (1986a: 28-29) and (1986b: 9-12).
Note: Central government is defined as the SWA Administration from 1950 to 1969, the authorities administering the SWA Account since 1969 and the Central Revenue Fund since 1979. To preserve data comparability, revenue items do not include loan levies, other loans, post office revenue and transfers made by the SWA Territorial Revenue Fund to the Central Revenue Fund. The distinction between revenue from uranium and other mining is not given in official records and is the author's own estimate.

50(a). MINING'S PERCENTAGE CONTRIBUTION TO CENTRAL GOVERNMENT REVENUE
Source of basic data: Table A.50.

51. NET MINING INCOME AND DIRECT AND INDIRECT TAXES:
Source of basic data: Tables A.15 and A.46.

52. GROSS VALUE OF MINERAL EXPORTS BY STAGE OF PROCESSING:
Source of basic data: Department of Economic Affairs (1950 to 1984).
Note: Raw materials are minerals in unprocessed form, viz bismuth, caesium, columbite, copper ore, lead ore, manganese ore, ambligonite, lepidolite ore, petalite, molibdenite, microlite, tantalite, scheelite, wolframite, beryl, calcite, feldspar, fluorspar, graphite, gypsum, mica, rock salt, sodium compounds, diamonds, roughly 80% of semi-precious stones, zinc/lead sulphide and oxide ore, and wollastonite.

Semi-processed materials are minerals in concentrated form, viz concentrates of copper, lead, tin, zinc, lead/copper, lead/vanadium, zinc/lead, tin/wolfram and of lepidolite as well as coarse, snoek and fine salt, kyanite and sillimanite.

Processed materials are minerals in refined form, viz arsenic, cadmium, blister copper, refined lead, germanium, gold, silver, uranium oxide, lime/hydrasol, zinc oxide, table salt, marble and aragonite and roughly 20% of semi-precious stones.

52(a) GROSS VALUE OF MINERAL EXPORTS BY STAGE OF PROCESSING (EXCLUDING DIAMONDS AND URANIUM):
Source: Table A.52

53. GROSS VALUE OF MINERAL EXPORTS BY COUNTRY OF DESTINATION (EXCLUDING DIAMOND AND URANIUM EXPORTS):
Source of basic data: Department of Economic Affairs (1970 to 1984).

53. SUMMARY OF GROSS VALUE OF MINERAL EXPORTS BY COUNTRY OF DESTINATION (EXCLUDING DIAMOND AND URANIUM EXPORTS):
Source of basic data: Table A.53.

55. FOREIGN LIABILITIES OF THE MINING INDUSTRY, 31 DECEMBER 1980:
Source of basic data: S.A. Reserve Bank (1983).
Note: Certain adjustment had to be made in the original data in order to fit into the national accounting framework of SWA/Namibia.

56. SWA/NAMIBIA'S SHARE IN WORLD PRODUCTION OF SELECTED MINERALS:
Source of basic data: Table A.7; US Bureau of Mines (various issues) and The British Petroleum Company (1984: 25).
Note: Where SWA/Namibian data were given incorrectly by the US Bureau of Mines, this as well as total production were adjusted according to the data in table A.7.

57. VALUE ADDED DIRECTLY AND INDIRECTLY ORIGINATING IN MINING:
Source of basic data: Table S.6 and S.9.
Note: For the period prior to 1970 an average weighted coefficient was used to determine the value added indirectly arising from capital outlays in mining.

58. MINING'S CONTRIBUTION TO TOTAL GROSS DOMESTIC PRODUCT - 1920 TO 1950:
59. MINERAL EXPORTS AS PERCENTAGE OF TOTAL MERCHANDISE EXPORTS - 1920 TO 1950:
Source of basic data: Krogh (1958).
Note: The original data had to be adjusted according to changed national accounting practices and to exclude the economic activity of Walvis Bay to preserve data comparability.

60. MINING TAXES AND TOTAL TAXES PAID:
Source of basic data: Table A.51 and Department of Finance (1986a: 22).

61. CONTRIBUTION OF MINING TO REMUNERATION OF EMPLOYEES:
Source of basic data: Table A.17 and Department of Finance (1986a: 19); prior to 1970: unpublished information from the Department of Finance.

62. SHARE OF REMUNERATION OF EMPLOYEES IN VALUE ADDED:
Source of basic data: Table A.17 and Department of Finance (1986: 25).

63. MINING'S EMPLOYMENT SHARE IN ECONOMICALLY ACTIVE POPULATION AND IN LABOUR FORCE:
Source of basic data: Tables A.3; A.34 and A.35; data for the unknown years were obtained by means of inter- and extrapolation.

64. INPUTS AND OUTPUTS OF TOTAL MINING AT CONSTANT 1975 PRICES:
Source of basic data: Table A.44.

65. DATA USED FOR ESTIMATING LABOUR PRODUCTIVITY IN MINING:

Source of basic data: Tables A.11; A.17 and A.35; CPI-data from unpublished information from the Department of Finance.

66. DATA USED FOR CALCULATING MARGINAL TAX PROPENSITY OF MINING:

Source of basic data: Table A.51.

67. DATA USED TO ESTIMATE A WEIGHTED INDEX OF INDUSTRIAL PRODUCTION:

Source of basic data: Tables A.53 and United Nations, Monthly Bulletin of Statistics, various issues.

Note: Only physical production of the larger trading partners were used to arrive at a weighted average index of industrial production.

TABLE A.1 - GROSS DOMESTIC PRODUCT BY TYPE OF ECONOMIC ACTIVITY AT CURRENT PRICES
R millions

YEAR	AGRICULTURE FISHING	MINING QUARRYING	MANUFACTURING	ELECTRICITY WATER	CONSTRUCTION	TRADE CATERING	TRANSPORT COMMUNICATION	FINANCE REAL ESTATE	COMMUNITY SERVICES	GENERAL GOVERNMENT	OTHER PRODUCERS	TOTAL
1950	17.9	17.3	1.4	0.2	1.9	5.4	3.5	2.7	0.6	3.2	1.1	55.2
1951	21.4	29.6	1.7	0.3	2.6	7.0	4.4	3.4	0.7	3.4	1.4	75.9
1952	22.0	32.6	2.7	0.3	2.7	8.2	5.3	3.9	0.8	4.2	1.6	84.3
1953	23.6	33.0	3.6	0.5	2.7	9.3	6.1	4.9	1.0	5.1	2.0	91.8
1954	26.2	34.5	4.5	0.5	2.5	10.1	6.6	5.4	1.1	6.0	2.2	99.6
1955	29.1	49.3	4.4	0.5	2.7	12.1	7.8	6.4	1.3	6.5	2.6	122.7
1956	27.4	60.0	4.7	0.6	2.5	12.6	8.2	6.7	1.4	7.2	2.7	134.0
1957	28.8	51.0	4.8	0.8	3.0	13.0	9.3	7.2	1.5	7.4	2.9	129.7
1958	27.8	42.9	4.9	1.0	3.8	11.0	8.5	7.7	1.6	8.1	3.1	120.4
1959	17.6	47.8	4.9	1.3	3.6	8.6	11.6	8.2	1.7	8.4	3.3	117.0
1960	5.3	39.6	6.1	1.4	4.3	16.4	12.0	10.4	2.0	8.8	4.1	110.4
1961	35.4	43.8	6.9	1.5	4.0	18.5	12.9	11.0	2.2	9.8	4.3	150.3
1962	37.5	48.2	7.0	1.7	4.8	17.5	14.0	11.5	2.3	10.7	4.6	159.8
1963	45.5	57.8	7.6	1.9	5.6	20.6	16.4	12.4	2.5	11.7	5.0	187.0
1964	43.5	83.3	8.5	2.2	7.0	21.1	18.3	14.0	2.8	12.4	5.5	218.6
1965	40.7	95.7	13.0	2.5	9.4	25.0	18.9	15.5	3.1	15.0	6.1	244.9
1966	40.5	116.7	13.2	2.6	10.5	26.3	18.6	16.3	3.6	17.6	6.9	272.8
1967	45.6	115.3	14.0	2.8	10.2	26.3	21.0	18.4	4.1	19.5	8.3	285.5
1968	64.1	115.4	15.4	3.2	10.4	29.6	22.1	21.8	4.6	23.4	9.2	319.2
1969	61.9	119.0	15.5	3.5	12.3	32.8	24.7	24.0	5.1	25.5	10.1	334.4
1970	48.9	103.0	15.6	3.5	18.8	47.1	25.7	27.4	5.6	30.6	10.5	336.7
1971	54.4	84.1	14.0	4.3	22.6	47.9	29.5	31.0	6.2	35.9	12.0	341.9
1972	66.1	112.7	17.7	5.8	23.3	56.3	31.4	36.3	6.8	41.1	13.4	410.9
1973	76.5	186.4	25.8	6.6	23.7	69.4	32.9	42.6	7.5	47.0	15.8	534.2
1974	88.1	169.1	30.5	5.8	27.6	85.2	34.5	48.2	9.0	53.6	17.6	569.2
1975	112.9	174.2	32.6	7.8	33.4	101.2	38.0	55.6	10.1	58.1	20.8	644.7
1976	134.1	215.1	35.7	9.4	37.7	122.1	41.8	59.6	11.6	65.9	25.1	758.1
1977	112.9	388.8	40.3	15.1	42.1	118.9	51.6	67.4	13.3	74.5	27.0	951.9
1978	107.1	531.3	44.5	17.4	44.2	120.3	62.0	74.7	15.3	91.7	29.5	1138.0
1979	112.6	584.3	53.9	21.3	48.9	149.1	71.8	79.6	16.5	103.2	32.8	1274.0
1980	131.3	630.0	56.5	26.3	50.6	166.3	76.7	77.0	18.6	138.8	37.0	1409.1
1981	167.1	454.4	67.2	36.4	67.3	204.9	78.3	88.2	24.1	227.1	40.9	1455.9
1982	186.3	465.6	82.7	43.3	69.6	228.4	83.8	111.7	28.8	316.3	47.7	1664.2
1983	141.0	473.3	93.5	61.4	64.5	234.9	107.6	127.0	34.0	368.3	53.5	1759.0
1984	136.4	510.4	102.6	66.8	61.1	255.6	131.3	152.7	39.3	430.1	61.5	1947.8
1985	156.0	908.1	113.2	77.9	71.8	282.9	143.9	175.7	44.2	469.9	68.3	2511.9

TABLE A.1(a) - COMPOSITION OF GROSS DOMESTIC PRODUCT AT CURRENT PRICES

Percentage

YEAR	AGRICUL- TURE FISHING	MINING QUAR- RYING	MANU- FAC- TURING	ELECTRI- CITY WATER	CON- STRUC- TION	TRADE CATE- RING	TRANS- PORT COMMUNI- CATION	FINANCE REAL ESTATE	COMMU- NITY SERVICES	GENERAL GOVERN- MENT	OTHER PRODU- CERS	TOTAL
1950	32.4	31.3	2.5	0.4	3.4	9.8	6.3	4.9	1.1	5.8	2.0	100.0
1951	28.2	39.0	2.2	0.4	3.4	9.2	5.8	4.5	0.9	4.5	1.8	100.0
1952	26.1	38.7	3.2	0.4	3.2	9.7	6.3	4.6	0.9	5.0	1.9	100.0
1953	25.7	35.9	3.9	0.5	2.9	10.1	6.6	5.3	1.1	5.6	2.2	100.0
1954	26.3	34.6	4.5	0.5	2.5	10.1	6.6	5.4	1.1	6.0	2.2	100.0
1955	23.7	40.2	3.6	0.4	2.2	9.9	6.4	5.2	1.1	5.3	2.1	100.0
1956	20.4	44.8	3.5	0.4	1.9	9.4	6.1	5.0	1.0	5.4	2.0	100.0
1957	22.2	39.3	3.7	0.6	2.3	10.0	7.2	5.6	1.2	5.7	2.2	100.0
1958	23.1	35.6	4.1	0.8	3.2	9.1	7.1	6.4	1.3	6.7	2.6	100.0
1959	15.0	40.9	4.2	1.1	3.1	7.4	9.9	7.0	1.5	7.2	2.8	100.0
1960	4.8	35.9	5.5	1.3	3.9	14.9	10.9	9.4	1.8	8.0	3.7	100.0
1961	23.6	29.1	4.6	1.0	2.7	12.3	8.6	7.3	1.5	6.5	2.9	100.0
1962	23.5	30.2	4.4	1.1	3.0	11.0	8.8	7.2	1.4	6.7	2.9	100.0
1963	24.3	30.9	4.1	1.0	3.0	11.0	8.8	6.6	1.3	6.3	2.7	100.0
1964	19.9	38.1	3.9	1.0	3.2	9.7	8.4	6.4	1.3	5.7	2.5	100.0
1965	16.6	39.1	5.3	1.0	3.8	10.2	7.7	6.3	1.3	6.1	2.5	100.0
1966	14.8	42.8	4.8	1.0	3.8	9.6	6.8	6.0	1.3	6.5	2.5	100.0
1967	16.0	40.4	4.9	1.0	3.6	9.2	7.4	6.4	1.4	6.8	2.9	100.0
1968	20.1	36.2	4.8	1.0	3.3	9.3	6.9	6.8	1.4	7.3	2.9	100.0
1969	18.5	35.6	4.6	1.0	3.7	9.8	7.4	7.2	1.5	7.6	3.0	100.0
1970	14.5	30.6	4.6	1.0	5.6	14.0	7.6	8.1	1.7	9.1	3.1	100.0
1971	15.9	24.6	4.1	1.3	6.6	14.0	8.6	9.1	1.8	10.5	3.5	100.0
1972	16.1	27.4	4.3	1.4	5.7	13.7	7.6	8.8	1.7	10.0	3.3	100.0
1973	14.3	34.9	4.8	1.2	4.4	13.0	6.2	8.0	1.4	8.8	3.0	100.0
1974	15.5	29.7	5.4	1.0	4.8	15.0	6.1	8.5	1.6	9.4	3.1	100.0
1975	17.5	27.0	5.1	1.2	5.2	15.7	5.9	8.6	1.6	9.0	3.2	100.0
1976	17.7	28.4	4.7	1.2	5.0	16.1	5.5	7.9	1.5	8.7	3.3	100.0
1977	11.9	40.8	4.2	1.6	4.4	12.5	5.4	7.1	1.4	7.8	2.8	100.0
1978	9.4	46.7	3.9	1.5	3.9	10.6	5.4	6.6	1.3	8.1	2.6	100.0
1979	8.8	45.9	4.2	1.7	3.8	11.7	5.6	6.2	1.3	8.1	2.6	100.0
1980	9.3	44.7	4.0	1.9	3.6	11.8	5.4	5.5	1.3	9.9	2.6	100.0
1981	11.5	31.2	4.6	2.5	4.6	14.1	5.4	6.1	1.7	15.6	2.8	100.0
1982	11.2	28.0	5.0	2.6	4.2	13.7	5.0	6.7	1.7	19.0	2.9	100.0
1983	8.0	26.9	5.3	3.5	3.7	13.4	6.1	7.2	1.9	20.9	3.0	100.0
1984	7.0	26.2	5.3	3.4	3.1	13.1	6.7	7.8	2.0	22.1	3.2	100.0
1985	6.2	36.2	4.5	3.1	2.9	11.3	5.7	7.0	1.8	18.7	2.7	100.0

TABLE A.2 - GROSS DOMESTIC PRODUCT AT CONSTANT 1975 PRICES, ANNUAL GROWTH RATE AND TREND CYCLES

YEAR	PERIOD	REAL GDP R'm	ANNUAL GROWTH %	TREND CYCLE R'm	DEVIATION %
1946	1	71.8	7.0%	92.7	-22.5%
1947	2	95.4	32.9%	102.5	-7.0%
1948	3	113.4	18.9%	113.4	.0%
1949	4	119.0	4.9%	125.4	-5.1%
1950	5	154.0	29.4%	138.7	11.0%
1951	6	174.9	13.6%	153.4	14.0%
1952	7	191.6	9.5%	169.7	12.9%
1953	8	205.9	7.5%	187.7	9.7%
1954	9	225.7	9.6%	207.6	8.7%
1955	10	269.1	19.2%	229.6	17.2%
1956	11	280.2	4.1%	253.9	10.4%
1957	12	292.5	4.4%	280.8	4.2%
1958*	13	276.9		310.6	
1959*	14	245.3		343.5	

1946 TO 1959: Y =83.82(1.1060)^t
with r = 0.94

YEAR	PERIOD	REAL GDP R'm	ANNUAL GROWTH %	TREND CYCLE R'm	DEVIATION %
1956*	1	280.2		248.2	
1957*	2	292.5		263.4	
1958	3	276.9	-5.3%	279.4	-0.9%
1959	4	245.3	-11.4%	296.5	-17.3%
1960	5	237.3	-3.3%	314.6	-24.6%
1961	6	339.2	42.9%	333.8	1.6%
1962	7	328.8	-3.1%	354.2	-7.2%
1963	8	411.7	25.2%	375.8	9.6%
1964	9	439.1	6.7%	398.7	10.1%
1965	10	465.2	5.9%	423.1	10.0%
1966	11	479.2	3.0%	448.9	6.7%
1967	12	480.0	0.2%	476.3	0.8%
1968	13	535.1	11.5%	505.4	5.9%
1969	14	567.0	6.0%	536.2	5.7%
1970	15	566.5	-0.1%	569.0	-0.4%
1971*	16	574.0		603.7	
1972*	17	578.8		640.6	

1956 to 1972: Y = 233.92(1.0611)^t
with r = 0.94

YEAR	PERIOD	REAL GDP R'm	ANNUAL GROWTH %	TREND CYCLE R'm	DEVITION %
1969*	1	567.0		577.5	
1970*	2	566.5		583.4	
1971	3	574.0	1.3%	589.4	-2.6%
1972	4	578.8	0.8%	595.4	-2.8%
1973	5	572.8	-1.0%	601.4	-4.8%
1974	6	596.9	4.2%	607.6	-1.8%
1975	7	644.7	8.0%	613.8	5.0%
1976	8	653.1	1.3%	620.0	5.3%
1977	9	677.7	3.8%	626.4	8.2%
1978	10	670.7	-1.0%	632.7	6.0%
1979	11	672.9	0.3%	639.2	5.3%
1980	12	643.9	-4.3%	645.7	-0.3%
1981	13	661.3	2.7%	652.3	1.4%
1982	14	665.2	0.6%	659.0	0.9%
1983	15	642.0	-3.5%	665.7	-3.6%
1984	16	640.0	-0.3%	672.5	-4.8%
1985	17	642.8	0.4%	679.3	-5.4%

1969 to 1985: Y = 571.7(1.01)^t
with r = 0.78

* The three trend cycles overlap, so that regressions for the three periods are not entirely insensitive to each other.

TABLE A.3 - POPULATION GROWTH AND PER CAPITA INCOME

YEAR	CURRENT GDP	REAL GDP	POPU-LATION	Per capita GDP (Rand)		
				At current prices	At constant '75 prices	At constant CPI
	R'm	R'm	Number			
1950	55.2	154.0	396,200	139	389	405
1951	75.9	174.9	407,600	186	429	502
1952	84.3	191.6	419,300	201	457	506
1953	91.8	205.9	431,400	213	477	507
1954	99.6	225.7	443,800	224	509	512
1955	122.7	269.1	456,500	269	589	583
1956	134.0	280.2	469,600	285	597	605
1957	129.7	292.5	483,100	268	605	549
1958	120.4	276.9	497,000	242	557	482
1959	117.0	245.3	511,300	229	480	446
1960	110.4	237.3	526,000	210	451	401
1961	150.3	339.2	544,200	276	623	521
1962	159.8	328.8	563,100	284	584	532
1963	187.0	411.7	582,600	321	707	600
1964	218.6	439.1	602,800	363	728	669
1965	244.9	465.2	623,700	393	746	696
1966	272.8	479.2	645,400	423	742	726
1967	285.5	480.0	667,700	428	719	713
1968	319.2	535.1	690,900	462	774	760
1969	334.4	567.0	714,800	468	793	743
1970	336.7	566.5	739,600	455	766	680
1971	341.9	574.0	762,400	448	753	634
1972	410.9	578.8	785,800	523	737	702
1973	534.2	572.8	810,000	660	707	820
1974	569.2	596.9	834,900	682	715	769
1975	644.7	644.7	860,500	749	749	749
1976	758.1	653.1	887,000	855	736	764
1977	951.9	677.7	914,200	1041	741	828
1978	1138.0	670.7	942,300	1208	712	868
1979	1274.0	672.9	971,300	1312	693	832
1980	1409.1	643.9	1,001,200	1407	643	794
1981	1455.9	661.3	1,031,900	1411	641	693
1982	1664.2	665.2	1,064,700	1563	625	665
1983	1759.0	642.0	1,098,500	1601	584	608
1984	1947.8	640.0	1,133,400	1719	565	598
1985	2511.9	642.8	1,169,400	2148	550	668

TABLE A.4 - THE URBAN POPULATION OF SWA/NAMIBIA (NUMBERS)

	1981				1970			
MAIN CENTRES	Black	Brown	White	TOTAL	Black	Brown	White	TOTAL
Windhoek	42,130	24,510	29,420	96,060	23,940	9,990	27,420	61,350
Rehoboth	1,940	10,400	40	12,380	1,150	4,110	100	5,360
Swakopmund	5,150	2,520	4,550	12,220	2,710	570	2,400	5,680
Keetmanshoop	1,560	7,190	2,750	11,500	1,540	5,500	3,260	10,300
Tsumeb	6,740	320	4,210	11,270	7,580	170	4,590	12,340
Otjiwarongo	6,550	150	2,390	9,090	4,990	480	2,550	8,020
Grootfontein	5,000	480	2,060	7,540	3,090	150	1,390	4,630
Okahandja	4,410	1,210	1,100	6,720	370	50	1,270	1,690
Gobabis	3,010	760	1,760	5,530	2,380	440	1,610	4,430
Mariental	1,430	2,600	1,340	5,370	1,460	1,860	1,310	4,630
SUBTOTAL	77,920	50,140	49,620	177,680	49,210	23,320	45,900	118,430
TOTAL POPULATION	840,020	115,960	75,950	1,031,930	582,960	74,110	82,560	739,630
% URBAN	9.3%	43.2%	65.3%	17.2%	8.4%	31.5%	55.6%	16.0%

TABLE A.5 - CURRENT ACCOUNT OF BALANCE OF PAYMENTS - R million

YEAR	MERCHANDISE EXPORTS	MERCHANDISE IMPORTS	TRADE BALANCE	NET PAYMENT: NON-FACTOR SERVICES	NET PAYMENT: FACTOR SERVICES	NET TRANSFERS	BALANCE ON SERVICES AND TRANSFERS	BALANCE ON CURRENT ACCOUNT
1950	41.2	-28.9	12.3	-2.6	-6.8	0.9	-8.5	3.8
1951	60.9	-38.9	22.0	-2.0	-12.6	1.0	-13.6	8.4
1952	67.7	-43.6	24.1	-2.4	-15.8	0.8	-17.4	6.7
1953	61.3	-52.9	8.4	-3.5	-15.6	1.2	-17.9	-9.5
1954	72.2	-48.9	23.3	-2.3	-17.4	0.9	-18.8	4.5
1955	88.8	-49.8	39.0	-2.5	-22.8	0.8	-24.5	14.5
1956	103.1	-57.0	46.1	-6.2	-28.0	1.5	-32.7	13.4
1957	96.5	-58.9	37.6	-7.0	-23.3	2.1	-28.2	9.4
1958	85.1	-55.1	30.0	-6.3	-18.5	3.1	-21.7	8.3
1959	88.6	-61.6	27.0	-8.4	-19.3	4.0	-23.7	3.3
1960	88.0	-73.9	14.1	-9.6	-16.8	3.5	-22.9	-8.8
1961	91.9	-70.6	21.3	-10.2	-18.7	2.8	-26.1	-4.8
1962	92.3	-78.0	14.3	-12.1	-19.2	2.5	-28.8	-14.5
1963	118.3	-84.7	33.6	-13.7	-22.5	2.7	-33.5	0.1
1964	151.1	-96.4	54.7	-12.3	-30.8	3.1	-40.0	14.7
1965	174.5	-106.0	68.5	-13.2	-34.4	3.5	-44.1	24.4
1966	198.8	-107.4	91.4	-15.3	-40.5	3.9	-51.9	39.5
1967	208.1	-120.0	88.1	-12.3	-37.1	4.4	-45.0	43.1
1968	207.5	-145.4	62.1	-18.8	-37.0	5.0	-50.8	11.3
1969	220.0	-153.3	66.7	-19.0	-36.8	16.4	-39.4	27.3
1970	198.5	-139.0	59.5	-16.5	-31.3	15.5	-32.3	27.2
1971	196.7	-184.2	12.5	-22.2	-35.8	17.1	-40.9	-28.4
1972	262.2	-194.3	67.9	-20.4	-23.3	20.3	-23.4	44.5
1973	343.1	-202.8	140.3	-36.0	-29.8	28.3	-37.5	102.8
1974	336.0	-328.9	7.1	-46.8	-49.1	24.0	-71.9	-64.8
1975	372.0	-417.0	-45.0	-55.8	-63.6	38.2	-81.2	-126.2
1976	447.9	-471.4	-23.5	-60.9	-113.6	48.2	-126.3	-149.8
1977	715.7	-541.0	174.7	-94.5	-132.7	54.4	-172.8	1.9
1978	879.3	-499.2	380.1	-83.3	-186.0	91.5	-177.8	202.3
1979	993.9	-618.5	375.4	-114.9	-191.5	51.5	-254.9	120.5
1980	1121.5	-877.4	244.1	-162.7	-188.1	71.2	-279.6	-35.5
1981	906.6	-1036.6	-130.0	-165.8	-131.5	342.6	45.3	-84.7
1982	1000.8	-1098.9	-98.1	-180.4	-162.5	466.4	123.5	25.4
1983	923.9	-1026.4	-102.5	-194.0	-100.4	528.1	233.7	131.2
1984	1086.8	-1158.8	-72.0	-197.6	-147.1	556.2	211.5	139.5
1985	1569.5	-1227.2	342.3	-258.9	-352.4	610.4	-0.9	341.4

TABLE A.6 - MERCHANDISE EXPORTS BY TYPE OF PRODUCT

R millions

YEAR	AGRICULTURAL PRODUCTS: RED MEAT	AGRICULTURAL PRODUCTS: KARAKUL PELTS	AGRICULTURAL PRODUCTS: OTHER	AGRICULTURAL PRODUCTS: SUB-TOTAL	UNPRO-CESSED FISH	MINERALS: DIA-MONDS	MINERALS: URANIUM	MINERALS: OTHER MINERALS	MINERALS: SUB-TOTAL	MANU-FACTURED PRODUCTS	ALL OTHER PRO-DUCTS	TOTAL MERCHAN-DISE EXPORTS
1950	5.2	8.7	0.9	14.8	0.0	12.9	-	9.1	22.0	2.9	1.5	41.2
1951	10.7	9.2	1.9	21.8	0.0	18.6	-	14.6	33.2	4.1	1.8	60.9
1952	7.0	9.4	1.3	17.7	0.1	23.4	-	21.0	44.4	3.4	2.1	67.7
1953	4.3	8.8	0.8	13.9	0.1	23.2	-	19.9	43.1	2.8	1.4	61.3
1954	9.4	8.1	1.7	19.2	0.2	26.2	-	20.8	47.0	4.0	1.8	72.2
1955	10.5	9.8	2.2	22.5	0.3	33.1	-	26.4	59.5	4.6	1.9	88.8
1956	11.4	10.0	2.2	23.6	0.6	38.6	-	34.1	72.7	4.6	1.6	103.1
1957	13.0	9.6	1.9	24.5	1.1	37.1	-	27.4	64.5	4.6	1.8	96.5
1958	14.7	9.0	1.9	25.6	2.1	30.6	-	20.4	51.0	4.8	1.6	85.1
1959	15.4	8.4	1.5	25.3	2.7	33.7	-	20.1	53.8	5.5	1.3	88.6
1960	15.3	8.3	1.7	25.3	3.4	34.2	-	17.6	51.8	6.5	1.0	88.0
1961	12.4	9.0	1.8	23.2	3.9	39.5	-	17.8	57.3	6.9	0.5	91.8
1962	9.7	11.1	1.7	22.5	4.4	37.2	-	17.8	55.0	8.8	1.6	92.3
1963	15.2	13.4	2.0	30.6	5.0	48.1	-	21.1	69.2	9.7	3.8	118.3
1964	15.6	12.6	2.1	30.3	5.5	66.4	-	32.9	99.3	11.4	4.6	151.1
1965	17.0	13.5	2.2	32.7	6.1	74.4	-	44.3	118.7	14.3	2.7	174.5
1966	14.3	14.9	2.2	31.4	6.4	93.5	-	45.6	139.1	16.2	5.7	198.8
1967	23.0	14.7	2.1	39.8	9.5	102.3	-	42.6	144.9	11.2	2.7	208.1
1968	25.2	16.5	2.2	43.9	12.7	87.2	-	46.7	133.9	11.3	5.7	207.5
1969	22.7	18.2	2.1	43.0	11.6	92.0	-	54.8	146.8	12.0	6.6	220.0
1970	25.8	20.6	2.0	48.4	6.8	69.4	-	57.8	127.2	12.1	4.0	198.5
1971	32.2	23.9	2.1	58.2	6.6	60.9	-	46.6	107.5	13.7	10.7	196.7
1972	44.3	31.8	2.2	78.3	6.5	97.5	-	50.3	147.8	17.1	12.5	262.2
1973	42.4	28.8	2.5	73.7	9.5	161.1	-	65.0	226.1	25.3	8.5	343.1
1974	38.4	24.0	2.3	64.7	12.9	134.8	-	95.1	229.9	16.3	12.2	336.0
1975	47.6	32.7	3.8	84.1	14.0	156.4	-	84.9	241.3	17.6	15.0	372.0
1976	47.8	45.5	4.6	97.9	13.4	199.3	8.8	90.0	298.1	24.6	13.9	447.9
1977	37.1	36.3	5.2	78.6	11.7	373.0	106.4	101.6	581.0	28.5	15.9	715.7
1978	43.6	30.5	5.5	79.6	16.2	465.4	143.4	121.2	730.0	29.5	24.0	879.3
1979	50.0	44.2	5.0	99.2	14.5	427.6	232.3	161.1	821.0	31.6	27.6	993.9
1980	65.7	36.0	7.1	108.8	13.1	446.7	283.0	178.7	908.4	53.2	38.0	1121.5
1981	109.9	20.0	8.6	138.5	23.6	231.0	288.0	138.4	657.4	47.7	39.4	906.6
1982	85.7	14.2	8.1	108.0	30.1	217.9	379.0	158.5	755.4	64.8	42.5	1000.8
1983	46.4	11.8	8.3	66.5	31.1	234.7	300.9	177.3	712.9	65.9	47.5	923.9
1984	55.0	13.6	11.3	79.9	25.6	231.6	417.1	202.9	851.6	65.5	64.2	1086.8
1985	89.0	17.7	10.8	117.5	41.6	409.0	584.7	289.6	1283.3	67.8	59.3	1569.5

TABLE A.6(a) - COMPOSITION OF MERCHANDISE EXPORTS

Percentage

	AGRICULTURAL PRODUCTS					MINERALS						
YEAR	RED MEAT	KARAKUL PELTS	OTHER	SUB-TOTAL	UNPRO-CESSED FISH	DIA-MONDS	URANIUM	OTHER MINERALS	SUB-TOTAL	MANU-FACTURED PRODUCTS	ALL OTHER PRO-DUCTS	TOTAL MERCHAN-DISE EXPORTS
1950	12.6	21.1	2.2	35.9	0.0	31.3	-	22.1	53.4	7.0	3.6	100.0
1951	17.6	15.1	3.1	35.8	0.0	30.5	-	24.0	54.5	6.7	3.0	100.0
1952	10.3	13.9	1.9	26.1	0.1	34.6	-	31.0	65.6	5.0	3.1	100.0
1953	7.0	14.4	1.3	22.7	0.2	37.8	-	32.5	70.3	4.6	2.3	100.0
1954	13.0	11.2	2.4	26.6	0.3	36.3	-	28.8	65.1	5.5	2.5	100.0
1955	11.8	11.0	2.5	25.3	0.3	37.3	-	29.7	67.0	5.2	2.1	100.0
1956	11.1	9.7	2.1	22.9	0.6	37.4	-	33.1	70.5	4.5	1.6	100.0
1957	13.5	9.9	2.0	25.4	1.1	38.4	-	28.4	66.8	4.8	1.9	100.0
1958	17.3	10.6	2.2	30.1	2.5	36.0	-	24.0	59.9	5.6	1.9	100.0
1959	17.4	9.5	1.7	28.6	3.0	38.0	-	22.7	60.7	6.2	1.5	100.0
1960	17.4	9.4	1.9	28.8	3.9	38.9	-	20.0	58.9	7.4	1.1	100.0
1961	13.5	9.8	2.0	25.3	4.2	43.0	-	19.4	62.4	7.5	0.5	100.0
1962	10.5	12.0	1.8	24.4	4.8	40.3	-	19.3	59.6	9.5	1.7	100.0
1963	12.8	11.3	1.7	25.9	4.2	40.7	-	17.8	58.5	8.2	3.2	100.0
1964	10.3	8.3	1.4	20.1	3.6	43.9	-	21.8	65.7	7.5	3.0	100.0
1965	9.7	7.7	1.3	18.7	3.5	42.6	-	25.4	68.0	8.2	1.5	100.0
1966	7.2	7.5	1.1	15.8	3.2	47.0	-	22.9	70.0	8.1	2.9	100.0
1967	11.1	7.1	1.0	19.1	4.6	49.2	-	20.5	69.6	5.4	1.3	100.0
1968	12.1	8.0	1.1	21.2	6.1	42.0	-	22.5	64.5	5.4	2.7	100.0
1969	10.3	8.3	1.0	19.5	5.3	41.8	-	24.9	66.7	5.5	3.0	100.0
1970	13.0	10.4	1.0	24.4	3.4	35.0	-	29.1	64.1	6.1	2.0	100.0
1971	16.4	12.2	1.1	29.6	3.4	31.0	-	23.7	54.7	7.0	5.4	100.0
1972	16.9	12.1	0.8	29.9	2.5	37.2	-	19.2	56.4	6.5	4.8	100.0
1973	12.4	8.4	0.7	21.5	2.8	47.0	-	18.9	65.9	7.4	2.5	100.0
1974	11.4	7.1	0.7	19.3	3.8	40.1	-	28.3	68.4	4.9	3.6	100.0
1975	12.8	8.8	1.0	22.6	3.8	42.0	-	22.8	64.9	4.7	4.0	100.0
1976	10.7	10.2	1.0	21.9	3.0	44.5	2.0	20.1	66.6	5.5	3.1	100.0
1977	5.2	5.1	0.7	11.0	1.6	52.1	14.9	14.2	81.2	4.0	2.2	100.0
1978	5.0	3.5	0.6	9.1	1.8	52.9	16.3	13.8	83.0	3.4	2.7	100.0
1979	5.0	4.4	0.5	10.0	1.5	43.0	23.4	16.2	82.6	3.2	2.8	100.0
1980	5.9	3.2	0.6	9.7	1.2	39.8	25.2	15.9	81.0	4.7	3.4	100.0
1981	12.1	2.2	0.9	15.3	2.6	25.5	31.8	15.3	72.5	5.3	4.3	100.0
1982	8.6	1.4	0.8	10.8	3.0	21.8	37.9	15.8	75.5	6.5	4.2	100.0
1983	5.0	1.3	0.9	7.2	3.4	25.4	32.6	19.2	77.2	7.1	5.1	100.0
1984	5.1	1.3	1.0	7.4	2.4	21.3	38.4	18.7	78.4	6.0	5.9	100.0
1985	5.7	1.1	0.7	7.5	2.7	26.1	37.3	18.5	81.8	4.3	3.8	100.0

TABLE A.7 - PHYSICAL VOLUME OF MINERAL PRODUCTION

	UNIT	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
NON-FERROUS BASE METALS:																					
ARSENIC........................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	1,757	1,005	1,245
BISMUTH........................	Kilograms	14,515	-	-	-	-	1,814	907	609	1,128	783	466	743	220	35	4,726	587	6	-	117	300
CADMIUM........................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31	132	161	157	246
CAESIUM ORE (POLLICITE).........	Kilograms	-	9,072	-	-	-	82	67,132	-	-	-	-	-	-	-	-	-	-	-	-	-
COLUMBITE......................	Kilograms	272	-	-	-	10,173	3,629	4,536	4,230	1,883	1,184	1,315	304	507	190	203	490	-	-	68	-
COPPER: BLISTER................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	1,214	20,814	28,511	33,032	29,706	31,310	30,609	20,460
CONCENTRATE...........	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	173	509	8,936	7,809	10,603	11,931
ORE...................	Tonnes	168	298	171	123	123	122	906	1,521	595	2,406	3,900	4,904	1,452	-	494	1,104	188	276	587	630
GERMANIUM......................	Kilograms	-	-	-	-	-	-	-	-	-	-	-	5,443	22,680	20,348	-	4,591	3,732	16,641	6,362	-
LEAD: CONCENTRATE.............	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,535
REFINED.................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	1,812	47,795	66,035	75,276	69,339	55,698	62,790
ORE.....................	Tonnes	29	-	-	-	-	126	118	26	-	-	-	-	-	-	-	-	-	-	-	-
SULPHIDE (CONC.).........	Tonnes	8,838	8,165	6,951	13,378	10,459	6,632	1,823	4,782	90	-	-	-	-	-	-	-	-	-	-	-
LEAD/COPPER (CONC.)............	Tonnes	67,922	84,015	103,783	108,810	104,064	153,973	187,761	194,748	180,497	183,683	169,815	137,824	189,250	156,322	67,522	56,619	138,545	-	-	-
LEAD/VANADIUM (CONC.)..........	Tonnes	1,549	5,130	7,017	1,745	1,025	7,482	3,674	3,791	4,405	7,280	8,500	10,337	9,168	10,206	9,916	11,476	12,066	7,657	6,151	3,847
LITHIUM: AMBLIGONITE...........	Tonnes	265	524	648	307	1,065	1,283	755	484	484	220	145	123	128	116	12	35	27	103	44	52
LEPIDOLITE (CONC.)	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,935
LEPIDOLITE ORE........	Tonnes	8,453	10,061	7,179	7,659	3,790	1,680	1,034	801	946	1,967	881	1,286	1,616	78	369	270	331	1,199	597	751
PETALITE.............	Tonnes	163	159	1,065	1,450	1,666	4,790	3,334	4,831	6,718	2,528	3,742	2,304	914	785	724	1,208	1,219	3,084	4,414	7,326
MANGANESE ORE..................	Tonnes	993	6,560	26,507	35,974	30,904	37,993	51,947	81,339	93,485	44,853	61,181	45,627	-	-	-	3,797	23,013	10,348	8,967	-
MICROLITE......................	Kilograms	-	-	-	22	114	226	75	7	5	-	-	-	-	-	-	-	-	-	-	-
MOLIBDENITE....................	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	486	-	-	209	-	-	-
TANTALITE......................	Kilograms	5,715	1,814	3,182	7,983	4,009	1,780	3,510	6,657	5,531	698	733	2,626	4,738	1,880	468	515	858	2,579	1,938	1,000
TIN (CONC.)....................	Tonnes	70	94	154	263	337	333	407	574	189	5	137	148	251	269	364	729	497	757	1,173	1,350
TIN/WOLFRAM (CONC.)............	Tonnes	95	60	-	-	-	-	589	732	103	4	491	589	584	764	671	598	618	638	567	540
TUNGSTEN: SCHEELITE............	Kilograms	3,992	10,705	8,346	998	23	891	1,828	3,999	-	12	1,858	6,347	2,052	-	22	612	704	29	325	73
WOLFRAMITE...........	Tonnes	-	27	100	137	91	111	134	36	14	-	-	-	-	-	-	-	-	1	4	2
ZINC: CONCENTRATE	Tonnes	19,459	26,512	27,499	23,823	30,193	29,742	29,291	28,841	28,389	27,939	27,488	27,131	26,774	26,417	9,208	6,291	13,179	24,990	9,291	51,743
OXIDE....................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,055
SILICATE (CONC.).........	Tonnes	-	-	-	-	-	-	-	-	-	-	-	735	6,015	8,733	11,022	12,746	17,872	22,045	25,655	23,242
SULPHIDE (CONC.)..........	Tonnes	2,380	4,134	5,812	-	-	643	5,452	14,229	181	-	630	-	-	-	7,185	345	-	-	-	-
ZINC/LEAD SULPHIDE (CONC.)......	Tonnes	-	-	-	-	-	-	-	-	-	-	-	4,844	8,883	9,394	7,548	5,606	6,015	6,668	12,165	1,796
ZINC/LEAD SULPHIDE AND OXIDE ORE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	1,043	11,027	8,555	16,402	5,933	3,348	4,100	490	-
PRECIOUS METALS:																					
GOLD...........................	Grams	850	-	-	-	-	-	-	-	-	-	-	-	5,217	85	907	28,406	-	-	-	-
SILVER.........................	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,829	5,602	5,082	15,095	45,592	56,530
FERROUS BASE METALS:																					
IRON ORE.......................	Tonnes	-	-	-	-	1,749	-	-	-	-	-	-	-	-	15,029	9,481	23,763	37,910	9,089	5,151	21,561
IRON PYRITE....................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SOURCES OF ENERGY:																					
URANIUM-OXIDE..................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE A.7 - PHYSICAL VOLUME OF MINERAL PRODUCTION / continued

	UNIT	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
NON-FERROUS BASE METALS:																	
ARSENIC........................	Tonnes	971	1,424	3,389	8,266	6,722	6,732	5,122	2,615	2,401	2,221	1,288	1,370	1,895	1,126	2,504	2,500
BISMUTH........................	Kilograms	230	66	21	3	-	-	-	-	-	-	-	-	-	-	-	-
CADMIUM........................	Tonnes	204	168	156	104	114	99	84	88	79	81	69	-	110	49	40	58
CAESIUM ORE (POLLICITE).........	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COLUMBITE......................	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COPPER: BLISTER................	Tonnes	27,750	26,618	26,120	36,049	46,612	36,410	36,110	53,371	46,603	42,707	40,004	39,719	50,552	54,212	47,661	47,600
CONCENTRATE...........	Tonnes	11,370	13,804	21,127	28,339	30,089	31,571	1,661	1,019	885	957	711	748	754	645	636	424
ORE....................	Tonnes	396	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GERMANIUM......................	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LEAD: CONCENTRATE.............	Tonnes	8,278	11,560	9,443	9,332	9,004	6,993	12,977	13,861	14,382	19,675	20,800	20,455	20,793	27,703	22,760	19,368
REFINED.................	Tonnes	61,185	63,756	63,964	63,592	64,342	44,272	39,598	42,743	39,512	41,695	42,654	41,729	40,590	35,416	27,066	38,500
ORE.....................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SULPHIDE (CONC.).........	Tonnes	1,781	1,372	697	1,055	3,514	2,796	2,778	2,015	-	-	-	-	-	-	-	-
LEAD/COPPER (CONC.)............	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LEAD/VANADIUM (CONC.)..........	Tonnes	7,289	6,126	4,698	9,143	6,533	6,611	6,789	4,559	4,117	-	-	-	-	-	-	-
LITHIUM: AMBLIGONITE...........	Tonnes	2	139	42	51	67	25	12	54	930	112	88	47	76	54	58	49
LEPIDOLITE (CONC.)	Tonnes	5,252	3,817	4,134	3,433	5,399	2,315	906	391	234	-	-	22	55	30	18	110
LEPIDOLITE ORE.........	Tonnes	496	1,591	248	-	-	11	458	1	-	-	-	-	-	-	-	-
PETALITE..............	Tonnes	3,054	9,750	5,681	3,500	1,334	1,217	123	380	523	928	793	1,194	859	708	829	1,753
MANGANESE ORE..................	Tonnes	-	-	-	-	-	-	-	-	-	-	-	3,237	2,200	-	-	-
MICROLITE......................	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MOLIBDENITE....................	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TANTALITE......................	Kilograms	1,000	2,000	2,000	57	10	347	396	45	950	293	10,700	11,045	8,847	-	-	4,600
TIN (CONC.)....................	Tonnes	1,326	1,267	1,115	1,172	1,330	1,107	1,179	1,319	1,293	1,307	1,208	1,228	1,326	1,381	1,514	1,500
TIN/WOLFRAM (CONC.)............	Tonnes	516	708	388	62	-	72	504	806	1,249	520	332	-	-	-	-	-
TUNGSTEN: SCHEELITE............	Kilograms	37	1,000	71	-	-	-	-	-	550	1,830	-	-	-	-	-	-
WOLFRAMITE...........	Tonnes	5	-	-	118	262	312	206	201	220	108	65	-	-	-	-	-
ZINC: CONCENTRATE..............	Tonnes	47,946	48,010	36,001	34,049	31,155	29,558	34,689	42,173	57,832	52,415	39,564	57,844	62,607	56,316	56,544	57,000
OXIDE....................	Tonnes	21,525	22,209	22,950	27,820	33,341	32,328	27,206	15,009	22,896	23,930	18,730	9,060	1,090	-	-	-
SILICATE (CONC.)..........	Tonnes	25,046	22,515	29,060	28,630	24,890	21,170	20,944	10,863	16,571	-	-	-	-	-	-	-
SULPHIDE (CONC.)..........	Tonnes	6,791	11,391	7,960	8,814	8,757	9,329	6,223	7,271	-	-	-	-	-	-	-	-
ZINC/LEAD SULPHIDE (CONC.)......	Tonnes	410	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZINC/LEAD SULPHIDE AND OXIDE ORE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PRECIOUS METALS:																	
GOLD...........................	Grams	-	-	-	-	-	-	49,800	69,500	172,000	55,300	25,810	35,210	191,710	247,380	198,455	194,000
SILVER.........................	Kilograms	57,460	41,000	37,000	50,000	41,000	50,000	32,700	43,700	120,400	119,100	75,600	107,560	86,437	91,123	89,324	98,000
FERROUS BASE METALS:																	
IRON ORE.......................	Tonnes	13,794	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IRON PYRITE....................	Tonnes	6,112	10,331	2,200	12,183	9,566	9,015	64,897	123,216	3,631	7,195	3,315	39,082	108,819	119,581	173,312	176,300
SOURCES OF ENERGY:																	
URANIUM-OXIDE..................	Tonnes	-	-	-	-	-	-	701	2,760	3,181	4,521	4,761	4,686	4,456	4,385	4,367	3,992

TABLE A.7 - PHYSICAL VOLUME OF MINERAL PRODUCTION / continued

	UNIT	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
NON-METALLICS:																					
BERYL	Tonnes	659	753	536	535	512	427	412	350	223	154	235	229	143	54	7	25	22	-	11	74
CALCITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FELDSPAR	Tonnes	-	-	-	-	-	-	-	-	-	-	-	95	472	2,232	1,923	2,318	-	95	444	-
FLUORSPAR	Tonnes	73	779	4,418	5,117	2,776	612	-	-	4	128	-	-	218	435	-	-	-	-	982	594
GRAPHITE	Tonnes	1,380	2,626	1,184	1,184	824	917	-	-	-	-	-	-	-	-	250	359	363	435	397	386
GYPSUM	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	771	685	769
LIME/HYDRASOL	Tonnes	-	-	-	-	275	1,652	2,616	2,947	3,325	3,231	3,004	3,403	2,927	2,923	3,718	3,570	3,123	3,033	3,735	3,057
LIMESTONE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20,501
MICA	Tonnes	59	45	18	-	-	-	-	-	-	-	-	-	68	543	376	118	24	143	172	172
REFRACTORIES: KYANITE	Tonnes	-	-	2,088	-	127	218	1,987	3,529	2,708	2,942	1,305	2,722	1,512	503	-	-	18	-	-	-
SILLIMANITE	Tonnes	-	59	634	-	-	-	-	-	-	-	-	-	-	-	70	-	-	-	-	-
SALT: COARSE	Tonnes	12,065	38,633	32,723	36,380	41,819	52,393	74,438	58,117	79,869	42,011	62,268	46,452	67,222	55,695	89,443	89,004	52,137	60,241	75,054	119,778
ROCK	Tonnes	3,915	4,706	6,887	4,696	4,902	6,354	4,546	6,313	6,394	4,966	4,089	4,365	4,450	5,089	5,443	4,516	4,931	4,604	4,007	3,895
SNOEK	Tonnes	734	718	454	136	499	635	1,820	1,382	1,361	3,175	3,629	3,629	3,629	3,629	3,629	3,175	6,360	3,266	2,631	1,999
FINE	Tonnes	104	528	82	9	132	68	181	405	91	136	2,309	1,154	272	272	318	454	454	679	816	994
TABLE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94
SILICA	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,599
SODIUM COMPOUNDS: BURKEITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
THENARDITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRONA	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WHITE QUARTZ	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WOLLASTONITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	118	209	336	100	910	4,708
ROCK:																					
DOLERITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MARBLE AND ARAGONITE	Tonnes	-	-	-	-	373	356	54	11	458	105	247	331	1,935	925	1,491	1,113	287	308	1,044	302
SLATE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	1,189	642	1,053	195	-	-	-
PRECIOUS STONES:																					
DIAMONDS	Carats	504,604	502,983	537,450	610,332	683,560	812,848	988,653	996,965	904,274	930,852	935,382	905,815	1,027,233	1,194,650	1,541,544	1,656,234	1,760,442	1,702,362	1,723,879	2,052,308
SEMI-PRECIOUS STONES:																					
AGATE	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,268	54,438	68	-	22,680	-
AMAZONITE	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	16,329	9,979	499	-	4,000	-	-
AMETHYST	Tonnes	-	-	-	-	1	8	2	-	19	-	14	3	142	62	53	129	3	8	19	62
AQUAMARINE	Grams	350	26	-	-	-	-	-	-	-	-	1,410	-	-	-	-	-	2,000	-	38	-
CHALCEDONY	Kilograms	-	-	-	-	-	1,039	5,000	4,545	-	305	6,305	13,727	3,629	882	3,232	7,414	886	591	907	-
JASPER	Kilograms	-	-	-	-	68	-	2,642	-	-	2,703	-	-	273	182	3,091	364	514	318	-	-
ROSE QUARTZ	Tonnes	-	-	-	-	-	-	-	3	2	4	2	0	-	-	14	-	8	1	14	3
GREEN QUARTZ	Kilograms	-	-	-	-	-	-	1,818	-	-	-	-	-	-	2,749	1,814	-	-	-	-	-
SODALITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	0	-	5	3	-
TOURMALINE	Grams	-	560	1,807	12,900	22,825	31,651	19,100	26,150	10,700	18,760	5,730	33,160	4,980	63,555	14,323	2,615	16,340	27,020	19,103	200
TIGER'S EYE	Kilograms	-	-	-	-	-	-	-	-	907	-	907	4,300	1,361	2,658	907	-	1,000	-	-	-
MINERAL SPECIMEN	Tonnes	57	-	324	-	-	-	-	26	-	-	-	-	3	-	-	23	287	-	-	-

TABLE A.7 - PHYSICAL VOLUME OF MINERAL PRODUCTION / concluded

	UNIT	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1965
NON-METALLICS:																	
BERYL	Tonnes	40	91	51	57	3	1	0	7	22	7	6	3	2	2	4	2
CALCITE	Tonnes	-	-	-	-	858	25,765	2,619	2,813	1,443	1,404	1,638	1,833	2,028	1,640	-	-
FELDSPAR	Tonnes	700	2,371	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FLUORSPAR	Tonnes	4,132	21,112	18,376	16,023	34,700	20,321	-	-	-	-	-	-	-	-	-	-
GRAPHITE	Tonnes	336	494	440	368	137	-	-	-	-	-	-	-	-	-	-	-
GYPSUM	Tonnes	397	-	-	-	-	-	-	-	-	-	-	-	-	128	-	-
LIME/HYDRASOL	Tonnes	11,066	5,000	4,504	3,405	1,732	2,400	3,920	3,984	4,293	4,177	4,404	3,092	1,097	544	-	600
LIMESTONE	Tonnes	14,875	19,681	16,347	17,280	24,787	39,972	19,343	20,332	9,928	11,860	12,037	17,566	21,621	14,622	21,639	31,617
MICA	Tonnes	72	453	383	690	405	210	50	-	315	83	543	252	6	92	87	-
REFRACTORIES: KYANITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SILLIMANITE	Tonnes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SALT: COARSE	Tonnes	132,010	133,973	131,834	141,044	201,342	191,338	223,284	187,405	173,116	188,169	207,671	182,958	175,211	136,561	84,760	146,500
ROCK	Tonnes	3,605	4,704	4,185	4,288	4,547	4,736	5,676	6,124	6,469	14,753	4,708	5,481	8,997	-	3,006	5,800
SNOEK	Tonnes	1,249	2,450	1,100	1,104	1,896	1,400	2,120	845	486	265	292	257	275	140	170	167
FINE	Tonnes	608	300	650	810	2,400	36,213	18,372	23,349	19,811	3,472	3,832	3,376	1,534	1,045	540	531
TABLE	Tonnes	200	245	285	605	802	769	772	837	909	864	954	840	715	757	740	727
SILICA	Tonnes	4,694	5,718	6,352	8,487	8,902	10,078	21,850	28,697	5,991	8,350	7,814	11,193	17,712	39,701	1,025	649
SODIUM COMPOUNDS: BURKEITE	Tonnes	-	-	-	-	-	590	4,895	19	-	-	-	-	-	-	-	-
THENARDITE	Tonnes	-	-	-	-	-	1,610	-	-	-	-	-	-	-	-	-	-
TRONA	Tonnes	-	-	-	-	-	4,189	70	-	-	-	-	-	-	-	-	-
WHITE QUARTZ	Tonnes	-	-	-	-	-	-	-	-	1,778	2,708	1,117	1,435	3,521	140	57	946
WOLLASTONITE	Tonnes	680	1,630	1,322	1,791	1,019	150	-	-	66	-	-	703	1,347	1,135	-	373
ROCK:																	
DOLERITE	Tonnes	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-
MARBLE AND ARAGONITE	Tonnes	240	60	15	-	3,935	567	508	900	1,653	1,092	875	760	88	777	1,861	3,115
SLATE	Tonnes	-	-	-	-	-	210	94	-	-	-	-	-	-	-	-	-
PRECIOUS STONES:																	
DIAMONDS	Carats	1,869,857	1,651,707	1,596,949	1,600,497	1,571,017	1,748,016	1,694,090	2,001,504	1,898,662	1,652,817	1,560,436	1,250,629	1,017,477	968,414	932,863	939,702
SEMI-PRECIOUS STONES:																	
AGATE	Kilograms	-	-	-	-	16,000	13,000	14,000	14,000	27,000	24,000	62,000	30,000	29,000	47,000	41,000	65,000
AMAZONITE	Kilograms	-	-	-	-	13,000	15,000	-	4,000	-	-	-	-	-	-	-	-
AMETHYST	Tonnes	37	142	21	24	29	27	17	34	27	16	33	29	47	162	105	18
AQUAMARINE	Grams	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CHALCEDONY	Kilograms	-	-	-	-	414	449	3,623	677	5,000	1,250	-	2,001	6,291	240	-	-
JASPER	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROSE QUARTZ	Tonnes	-	-	-	-	39	39	4	32	89	34	274	60	156	348	369	218
GREEN QUARTZ	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SODALITE	Tonnes	-	76	108	105	94	78	97	103	17	5	78	21	-	-	-	-
TOURMALINE	Grams	656	3,250	2,000	8,000	-	-	-	-	-	-	6,300	102,700	152,800	125,000	306,000	153,846
TIGER'S EYE	Kilograms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MINERAL SPECIMEN	Tonnes	-	-	-	-	286	2,190	782	3,243	5,671	2,324	4,361	6,102	2,410	2,898	2,500	2,941

TABLE A.8 - GROSS VALUE OF MINERAL SALES AT CURRENT PRICES - RAND

METAL OR MINERAL	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Copper (blister)...............	-	-	-	-	-	-	-	-	-	-	-	-	302,258	8,091,612	13,952,911	15,033,896	19,241,500	22,543,969
Lead (refined).................	-	-	-	-	-	-	-	-	-	-	-	-	-	47,800	7,109,478	14,811,541	12,287,386	10,172,768
Arsenic........................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,392	111,456
Cadmium........................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88,751	383,499	679,808
Germanium......................	-	-	-	-	-	-	-	-	-	-	-	425,724	1,343,246	25,631	575,818	300,011	210,656	238,304
Copper (conc.).................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15,000	104,786	3,460,850	2,868,774
Lead (conc.)...................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead sulphide (conc.)..........	529,892	857,440	823,006	1,324,154	975,582	956,572	235,200	493,700	166,000	-	-	-	-	-	-	-	-	-
Tin (conc.)....................	53,762	104,412	149,728	126,834	261,742	272,000	360,914	578,000	186,400	-	145,000	142,400	176,340	329,000	445,079	800,100	993,848	955,045
Zinc (conc.)...................	2,146,062	2,621,524	2,985,768	1,418,228	993,215	1,710,433	1,765,485	1,818,385	1,868,608	1,916,541	1,961,877	2,004,975	2,052,731	1,882,918	1,093,418	1,638,960	544,297	1,237,260
Zinc sulphide (conc.)..........	119,214	113,824	638,230	-	-	44,000	204,600	697,200	126,000	-	20,300	-	-	-	203,117	117,560	146,000	-
Zinc silicate (conc.)..........	-	-	-	-	-	-	-	-	-	-	-	22,580	79,635	141,224	250,338	362,795	355,160	279,900
Zinc oxide.....................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead/copper (conc.)............	5,726,358	9,540,732	13,899,946	14,996,644	17,144,915	21,853,491	27,493,605	19,985,893	14,404,634	16,379,593	13,441,965	11,987,312	12,003,928	8,538,822	6,763,215	8,558,697	4,722,747	-
Lead/vanadium (conc.)..........	281,602	677,180	1,049,398	312,256	298,474	107,227	1,647,610	535,740	291,250	390,596	465,418	777,626	625,626	748,930	740,741	786,350	1,509,160	1,186,800
Zinc/lead sulphide (conc.)......	-	-	-	-	-	-	-	-	-	-	-	213,290	282,318	322,450	298,355	314,874	215,993	477,400
Zinc/lead sulphide and oxide ore	-	-	-	-	-	-	-	-	-	-	-	26,910	89,250	141,010	545,600	305,685	36,693	-
Tin/wolfram (conc.)............	65,102	54,016	-	-	-	202,500	333,000	402,000	65,000	7,500	50,000	250,000	307,420	438,800	396,800	303,800	421,000	540,000
Bismuth........................	12,394	400	342	280	-	250	250	688	1,518	-	-	-	440	249	7,800	1,156	-	-
Caesium ore (Pollicite).........	24	80	86	90	150	260	3,168	3,220	600	730	-	394	100	-	-	150	150	300
Columbite......................	352	162	-	-	-	550	-	4,230	5,684	306	928	-	-	-	1,119	460	-	-
Copper ore.....................	6,998	1,223	-	25,926	-	-	65,444	82,246	42,442	97,040	143,014	471,377	102,762	-	27,581	52,517	-	3,067
Manganese ore..................	-	88,312	639,802	856,584	564,920	539,064	1,273,280	2,052,884	2,722,778	871,000	1,043,360	1,183,779	26,000	8,000	-	-	458,037	257,600
Molibdenite....................	-	-	-	-	-	-	-	-	-	-	-	-	-	400	-	-	50	-
Lead ore.......................	1,400	-	-	-	-	5,236	7,716	1,050	-	-	-	-	-	-	-	-	-	-
Lithium: Ambligonite..........	1,602	3,672	23,404	28,702	47,752	120,542	50,542	53,790	23,288	3,804	-	3,104	5,785	8,440	-	2,684	900	3,925
Lepidolite ore........	70,934	107,004	101,040	125,222	57,484	33,474	14,534	26,554	5,704	27,018	11,476	15,372	22,371	5,115	8,780	2,546	12,727	25,079
Lepidolite (conc.)....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petalite.............	2,864	3,972	20,994	18,518	11,636	16,236	60,920	113,684	85,914	22,828	25,582	39,421	5,720	12,247	19,000	17,122	22,877	60,015
Microlite......................	-	-	-	-	1,200	508	1,080	262	-	-	-	-	-	-	-	-	-	-
Tantalite......................	5,260	7,400	18,178	33,666	28,646	6,056	7,396	11,832	13,348	139	-	4,762	15,906	4,000	500	1,474	-	9,922
Tungsten: Scheelite...........	6,970	20,670	19,432	4,100	-	-	4,056	962	-	-	-	-	5,835	-	-	-	-	-
Wolframite..........	5,838	25,969	175,803	189,180	49,453	38,825	85,711	23,480	-	-	-	-	-	-	-	-	-	-
TOTAL: NON-FERROUS BASE METALS	9,036,628	14,227,992	20,545,157	19,460,384	20,435,169	25,907,224	33,614,511	26,885,800	20,009,168	19,717,095	17,308,920	17,569,026	17,447,671	20,746,648	32,454,650	43,605,915	45,025,922	41,651,392
Gold...........................	800	-	-	-	-	-	-	-	-	-	-	-	9,050	134	50	400	-	-
Silver.........................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	268,724	160,413	409,223
TOTAL: PRECIOUS METALS.........	800	-	-	-	-	-	-	-	-	-	-	-	9,050	134	50	269,124	160,413	409,223
Iron ore.......................	-	-	-	-	20	2,280	-	-	-	-	-	-	-	51,910	33,443	115,820	133,726	32,061
Iron pyrite....................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL: FERROUS BASE METALS	-	-	-	-	-	-	-	-	-	-	-	-	-	51,910	33,443	115,820	133,726	32,061
Uranium oxide..................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL: SOURCES OF ENERGY.......	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE A.8 - GROSS VALUE OF MINERAL SALES AT CURRENT PRICES / continued - RAND

METAL OR MINERAL	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Copper (blister)...............	24,091,145	23,893,962	27,913,496	17,874,386	20,920,103	26,768,369	40,500,205	40,287,551	44,951,298	48,210,164	53,884,150	69,611,993	69,812,839	55,573,447	76,855,497	91,759,321	100,407,172	157,693,800
Lead (refined).................	9,480,120	12,381,920	11,757,066	12,322,742	11,552,886	17,034,689	22,682,484	15,297,676	13,588,753	18,466,707	23,417,638	32,817,933	32,710,036	23,407,581	23,507,450	19,413,185	19,585,190	32,799,360
Arsenic........................	73,152	101,580	76,687	168,536	160,812	389,308	323,987	763,522	638,151	564,555	554,542	692,347	392,237	665,640	1,045,250	1,374,721	1,940,654	2,711,972
Cadmium........................	718,713	1,092,812	936,101	457,156	560,441	769,972	643,301	383,650	405,812	376,957	288,648	311,181	298,513	184,083	112,930	226,248	346,881	125,029
Germanium......................	213,863	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (conc.).................	4,324,105	6,662,539	4,368,084	3,881,607	8,158,008	11,821,376	11,275,747	7,009,258	415,889	436,361	405,709	558,703	444,083	428,001	445,134	421,996	482,257	500,000
Lead (conc.)...................	-	947,242	1,140,192	1,067,452	1,067,531	1,390,607	1,730,907	1,181,477	2,302,941	1,991,432	2,548,880	5,195,873	4,140,956	3,881,002	2,816,663	7,569,350	6,573,170	7,443,897
Lead sulphide (conc.)..........	-	-	148,500	82,000	-	-	263,990	384,767	608,745	502,180	-	-	-	-	-	-	-	-
Tin (conc.)....................	1,789,591	2,125,524	2,161,846	1,875,711	1,920,965	2,099,394	4,363,795	3,391,935	4,871,027	7,276,878	8,513,856	9,606,961	8,978,022	10,476,407	11,178,589	12,630,368	15,767,980	23,611,070
Zinc (conc.)...................	990,393	2,342,669	2,996,511	3,360,100	3,639,195	3,477,646	5,887,462	5,047,499	6,327,181	5,773,372	6,743,619	8,333,537	6,308,887	10,733,900	14,143,915	11,492,807	20,898,019	24,284,704
Zinc sulphide (conc.)..........	-	-	218,734	761,133	661,610	927,221	1,261,880	1,352,400	1,235,965	1,131,250	-	-	-	-	-	-	-	-
Zinc silicate (conc.)..........	284,700	756,148	556,093	424,871	1,086,442	2,134,220	3,247,497	3,159,129	3,058,342	2,140,131	2,404,452	-	-	-	-	-	-	-
Zinc oxide.....................	-	455,283	1,147,531	1,398,283	2,108,494	3,221,752	5,379,445	5,994,098	5,913,452	4,280,621	2,801,699	3,384,521	1,909,071	1,824,670	278,408	-	-	-
Lead/copper (conc.)............	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead/vanadium (conc.)..........	783,800	594,300	1,741,000	1,492,800	795,620	1,599,540	1,356,620	2,148,363	2,252,599	1,542,182	939,387	-	-	-	-	-	-	-
Zinc/lead sulphide (conc.)......	373,800	592,500	211,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc/lead sulphide and oxide ore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin/wolfram (conc.)............	504,000	459,000	477,000	549,000	447,000	45,000	-	99,516	1,044,426	3,186,566	2,506,348	2,043,584	1,295,110	-	-	-	-	-
Bismuth........................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caesium ore (Pollicite).........	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Columbite......................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper ore.....................	-	71,100	9,783	5,414	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese ore..................	260,910	-	-	-	-	-	-	-	-	-	-	-	-	29,414	7,000	-	-	-
Molibdenite....................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead ore.......................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithium: Ambligonite..........	963	1,585	1,739	9,368	5,907	3,699	6,378	4,423	4,500	10,400	26,236	23,045	33,652	36,490	20,160	53,831	12,200	55,969
Lepidolite ore........	32,684	23,968	12,333	23,602	11,937	-	-	-	20,350	-	-	-	-	-	-	-	-	-
Lepidolite (conc.)....	-	142,701	173,540	113,852	305,248	274,982	260,097	225,000	210,000	-	33,345	-	40,160	173,875	29,830	38,248	2,957	36,244
Petalite.............	52,472	63,481	170,901	49,316	117,174	115,914	48,358	14,542	147,000	-	25,000	96,984	56,862	37,936	244,301	161,404	171,274	392,545
Microlite......................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tantalite......................	11,121	32,353	18,917	62,120	-	-	-	-	-	-	35,000	2,750	611,445	394,727	-	-	-	313,618
Tungsten: Scheelite...........	930	-	-	-	-	-	-	-	-	-	4,000	14,000	-	-	-	-	-	-
Wolframite..........	6,410	-	-	-	-	284,000	1,027,160	1,372,050	1,516,654	1,973,000	1,805,000	674,813	747,468	-	-	-	-	-
TOTAL: NON-FERROUS BASE METALS	43,992,872	52,740,667	56,237,654	45,979,449	53,519,373	72,357,689	100,259,313	88,116,856	89,513,085	97,862,756	106,937,509	133,368,225	127,779,341	107,847,173	130,685,127	145,141,479	166,187,754	249,968,208
Gold...........................	-	-	-	-	-	-	-	-	172,661	274,782	863,626	406,005	422,722	494,659	2,712,832	3,755,477	3,538,558	4,875,042
Silver.........................	2,301,484	2,393,269	2,391,935	1,383,750	1,485,920	3,227,000	4,008,980	5,333,888	4,181,502	6,165,892	17,039,536	31,415,676	52,286,370	30,783,156	27,652,954	42,063,861	43,521,188	45,747,975
TOTAL: PRECIOUS METALS........	2,301,484	2,393,269	2,391,935	1,383,750	1,485,920	3,227,000	4,008,980	5,333,888	4,354,163	6,440,674	17,903,162	31,821,681	52,709,092	31,277,815	30,365,786	45,819,338	47,059,746	50,623,017
Iron ore.......................	18,170	65,605	48,693	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron pyrite....................	-	-	133,425	225,526	48,026	265,955	215,522	209,418	1,552,985	3,034,810	91,973	187,286	88,577	1,071,628	3,059,990	3,472,937	4,725,000	4,936,400
TOTAL: FERROUS BASE METALS	18,170	65,605	182,118	225,526	48,026	265,955	215,522	209,418	1,552,985	3,034,810	91,973	187,286	88,577	1,071,628	3,059,990	3,472,937	4,725,000	4,936,400
Uranium oxide..................	-	-	-	-	-	-	-	-	8,810,000	106,410,000	143,406,000	232,335,000	282,999,000	288,022,000	378,973,000	300,916,000	417,159,000	584,679,000
TOTAL: SOURCES OF ENERGY.......	-	-	-	-	-	-	-	-	8,810,000	106,410,000	143,406,000	232,335,000	282,999,000	288,022,000	378,973,000	300,916,000	417,159,000	584,679,000

TABLE A.8 - GROSS VALUE OF MINERAL SALES AT CURRENT PRICES / continued - RAND

METAL OR MINERAL	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Beryl	57,836	89,880	140,100	200,750	130,314	93,300	93,126	74,040	58,454	25,472	15,140	23,859	26,130	6,520	8,225	5,695	1,184	13,000
Calcite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Feldspar	-	-	-	-	-	-	-	-	-	-	-	800	3,465	7,965	19,964	14,208	6,669	3,301
Fluorspar	-	9,410	35,700	56,200	30,616	6,750	-	-	336	-	-	-	1,720	-	-	-	-	-
Graphite	9,024	35,920	19,308	-	1,462	12,420	-	-	-	-	-	-	-	-	8,222	4,084	2,560	8,000
Gypsum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,320
Lime/hydrosol	-	-	-	-	6	7,302	30,032	38,882	45,012	44,964	41,170	50,031	44,821	37,974	49,084	45,757	40,812	42,019
Limestone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mica	-	-	-	-	-	-	-	-	-	-	-	-	-	10,783	4,317	1,318	658	-
Refractories: Kyanite	-	-	46,400	-	498	1,450	22,664	86,398	51,038	43,340	4,550	31,069	44,715	-	11,077	-	356	-
Sillimanite	-	824	8,178	-	-	-	-	-	-	-	-	-	-	-	824	5,890	-	-
Salt: Coarse	60,308	213,840	186,998	156,790	227,340	370,610	409,354	395,778	323,988	285,766	233,452	217,394	248,620	242,278	395,153	289,768	316,332	320,418
Rock	19,852	29,024	30,644	32,254	33,328	36,706	34,220	35,510	32,552	22,904	18,886	18,420	23,189	23,147	38,584	22,412	39,625	26,047
Snoek	8,334	14,308	12,296	10,122	5,414	15,410	20,602	12,732	17,518	13,804	18,714	18,626	19,380	22,473	26,782	21,874	39,299	21,737
Fine	1,340	8,576	6,244	3,454	4,238	3,422	6,874	1,554	2,104	1,720	17,228	7,573	1,811	3,262	4,076	4,845	5,222	5,450
Table	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium compounds: Burkeite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thenardite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White quartz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wollastonite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	4,983	1,124	5,680
TOTAL: NON-METALICS	156,694	401,782	485,868	459,570	433,216	547,370	616,872	644,894	531,002	437,970	349,140	367,772	413,851	354,402	566,468	421,034	453,841	453,972
Marble and Aragonite	-	-	-	-	4,164	7,876	6,882	8,200	1,590	-	260	455	12,950	1,445	3,878	-	-	12,500
Doletrite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Slate	-	-	-	-	-	-	-	-	-	-	-	-	-	7,371	5,736	7,987	-	-
TOTAL: ROCK	-	-	-	-	4,164	7,876	6,882	8,200	1,590	-	260	455	12,950	8,816	9,614	7,987	-	12,500
Diamonds	12,868,490	18,627,348	23,438,566	23,209,514	26,154,974	33,063,328	38,572,976	37,046,656	30,629,082	33,728,214	34,159,960	39,464,510	37,194,002	48,073,692	66,409,922	74,416,514	93,467,474	102,246,858
TOTAL: PRECIOUS STONES	12,868,490	18,627,348	23,438,566	23,209,514	26,154,974	33,063,328	38,572,976	37,046,656	30,629,082	33,728,214	34,159,960	39,464,510	37,194,002	48,073,692	66,409,922	74,416,514	93,467,474	102,246,858
Agate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	345	3,820	150	-
Amazonite	-	-	-	-	-	-	-	-	-	-	-	-	-	2,449	1,497	75	-	603
Amethyst	-	-	-	-	136	3,184	1,309	-	7,620	-	4,355	735	35,146	13,990	25,436	95,361	2,133	4,021
Aquamarine	5,184	447	-	-	-	-	-	-	-	-	54,722	-	-	-	-	-	106,560	-
Chalcedony	-	-	-	-	-	966	4,900	4,681	-	329	7,176	16,198	4,573	1,173	4,546	10,750	1,320	904
Jasper	-	-	-	-	11	-	590	-	-	840	-	-	71	46	711	87	129	83
Rose quartz	-	-	-	-	-	-	-	396	682	1,197	514	96	-	-	5,132	-	3,612	427
Green quartz	-	-	-	-	-	-	2,000	-	-	-	-	-	-	1,200	650	-	-	-
Sodalite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,833	150	-	4,960
Tourmaline	-	373	1,556	13,540	28,262	45,158	28,163	39,807	16,799	30,349	9,543	56,811	8,770	114,954	26,591	4,980	31,896	54,040
Tiger's eye	-	-	-	-	-	-	-	-	400	-	400	2,238	700	1,100	600	-	661	-
Mineral specimen	174	-	1,265	-	-	-	-	180	-	-	-	-	20	-	-	200	2,538	-
TOTAL: SEMI-PRECIOUS STONES	5,358	820	2,821	13,540	28,409	49,308	36,962	45,064	25,501	32,715	76,710	76,078	49,280	134,912	71,341	115,423	148,999	65,038

TABLE A.8 - GROSS VALUE OF MINERAL SALES AT CURRENT PRICES / concluded - RAND

METAL OR MINERAL	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Beryl..........................	16,855	35,200	6,005	10,250	-	11,036	360	-	-	-	-	1,500	3,029	-	6,767	-	18,218	20,674
Calcite........................	-	-	-	-	-	-	8,580	165,865	26,190	28,130	14,430	14,040	24,570	27,495	30,420	24,603	-	-
Feldspar.......................	7,140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorspar......................	19,139	-	1,122	59,551	20,215	21,650	593,794	457,703	-	-	-	-	-	-	-	-	-	-
Graphite.......................	2,000	5,540	6,300	8,854	4,660	5,750	7,675	2,150	-	-	-	-	-	-	-	-	-	-
Gypsum.........................	3,902	2,095	6,429	-	-	-	-	-	-	-	-	-	-	-	-	5,760	-	-
Lime/hydrosol..................	54,076	56,995	67,381	83,227	78,307	66,605	37,302	73,060	117,477	150,409	196,590	203,750	231,720	173,875	83,850	47,950	-	33,200
Limestone......................	-	81,670	53,948	72,622	60,321	46,426	117,738	237,023	135,401	176,739	100,273	136,271	153,953	239,073	312,423	247,989	389,502	385,727
Mica...........................	1,374	-	1,035	11,705	11,820	17,664	14,284	10,184	-	-	11,942	6,772	29,389	14,885	16,780	9,360	15,201	-
Refractories: Kyanite..........	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sillimanite......	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salt: Coarse...................	344,486	497,416	559,428	430,174	541,759	585,436	1,146,622	1,324,738	1,546,060	2,147,387	1,506,518	1,969,639	2,532,156	2,511,910	2,169,891	1,914,048	1,390,178	2,220,623
Rock.....................	25,971	38,723	19,205	23,284	21,424	29,481	35,646	53,326	-	-	101,724	82,033	44,726	84,626	135,347	-	122,541	127,097
Snoek....................	18,998	16,039	11,324	11,076	5,085	5,306	13,396	18,061	22,160	3,822	5,074	2,330	3,777	3,568	3,745	2,349	2,391	2,157
Fine.....................	6,678	10,058	8,252	2,858	2,924	4,902	24,186	29,782	32,865	28,160	160,091	37,954	44,516	42,048	32,774	18,395	15,493	13,976
Table....................	-	3,069	1,308	18,321	20,395	42,784	60,974	70,032	79,900	95,362	114,364	120,785	161,822	152,852	137,729	188,333	191,068	172,362
Silica.........................	-	65,605	12,657	15,153	16,834	24,690	28,303	47,064	118,864	192,571	47,089	74,649	77,749	118,534	199,083	523,656	14,534	6,230
Sodium compounds: Burkeite.....	-	-	-	-	-	-	-	-	301,809	-	-	-	-	-	-	-	-	-
Thenardite...	-	-	-	-	-	-	-	61,542	54,517	-	-	-	-	-	-	-	-	-
Trona........	-	-	-	-	-	-	-	361,984	69,441	-	-	-	-	-	-	-	-	-
White quartz...................	-	-	-	-	-	-	-	-	-	-	82,512	170,816	55,316	167,156	234,739	11,923	14,704	337,663
Wollastonite...................	16,300	33,525	14,600	33,600	24,800	20,975	31,707	3,700	-	900	2,600	-	-	24,780	42,464	34,058	-	6,718
TOTAL: NON- METALLICS..........	516,919	845,935	768,994	780,675	808,544	882,705	2,120,567	2,916,214	2,504,684	2,823,480	2,343,207	2,820,539	3,362,723	3,560,802	3,406,012	3,028,424	2,173,830	3,326,427
Marble and Aragonite...........	15,340	3,033	-	906	200	-	50,737	51,277	33,200	60,588	38,283	23,464	67,057	36,030	7,273	52,464	878,651	374,689
Doletrite......................	-	-	-	-	-	-	-	-	-	-	-	-	600	-	-	-	-	-
Slate..........................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL: ROCK....................	15,340	3,033	0	906	200	0	50,737	51,277	33,200	60,588	38,283	23,464	67,657	36,030	7,273	52,464	878,651	374,689
Diamonds.......................	87,185,823	91,954,430	69,449,886	60,846,280	97,530,576	161,120,110	134,783,260	156,402,854	199,342,938	372,997,180	465,459,396	427,638,170	446,712,206	230,973,615	217,945,968	232,756,582	231,577,839	409,001,095
TOTAL: PRECIOUS STONES.........	87,185,823	91,954,430	69,449,886	60,846,280	97,530,576	161,120,110	134,783,260	156,402,854	199,342,938	372,997,180	465,459,396	427,638,170	446,712,206	230,973,615	217,945,968	232,756,582	231,577,839	409,001,095
Agate..........................	5,800	-	7,700	-	-	-	8,240	20,285	11,340	22,400	32,400	24,720	58,900	45,900	50,750	102,300	117,965	340,280
Amazonite......................	-	-	-	-	-	-	9,380	16,000	-	4,000	-	-	-	-	-	-	-	-
Amethyst.......................	11,032	38,740	49,531	88,727	28,112	37,071	50,767	77,553	40,061	80,164	65,725	106,410	164,134	174,946	495,606	405,092	327,372	33,500
Aquamarine.....................	2,207	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chalcedony.....................	1,424	-	-	-	-	-	750	830	6,812	1,300	9,750	2,050	-	4,662	16,860	648	-	-
Jasper.........................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rose quartz....................	5,245	1,700	840	-	-	-	11,700	11,700	1,200	11,840	38,292	16,677	120,894	28,736	60,941	118,278	118,253	166,400
Green quartz...................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodalite.......................	1,900	-	-	50,244	69,882	66,466	129,287	128,011	150,462	191,093	27,819	7,088	93,505	27,400	-	-	-	-
Tourmaline.....................	41,007	459	1,601	9,160	6,394	28,606	-	-	-	-	-	-	39,225	678,318	1,067,076	750,000	1,836,000	1,000,000
Tiger's eye....................	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mineral specimen...............	-	-	-	-	-	-	5,647	43,015	15,274	62,905	80,051	39,399	117,780	293,883	167,499	231,777	200,000	250,000
TOTAL: SEMI-PRECIOUS STONES....	68,615	40,899	59,672	148,131	104,388	132,143	215,771	297,394	225,149	373,702	254,037	196,344	594,438	1,253,845	1,858,732	1,608,095	2,599,590	1,790,180

TABLE A.9 - SUMMARY OF GROSS VALUE OF MINERAL SALES - R ' 000

YEAR	NON-FERROUS BASE METALS	PRECIOUS METALS	FERROUS BASE METALS	NON-METAL-LICS	ROCK & SEMI-PRE-CIOUS STONES	SUB-TOTAL	SOURCES OF ENERGY	TOTAL	PRECIOUS STONES	GRAND TOTAL
1950	9,037	1	-	157	5	9,199	-	9,199	12,868	22,068
1951	14,228	-	-	402	1	14,631	-	14,631	18,627	33,258
1952	20,545	-	-	486	3	21,034	-	21,034	23,439	44,473
1953	19,460	-	-	460	14	19,934	-	19,934	23,210	43,143
1954	20,435	-	0	433	32	20,900	-	20,900	26,155	47,055
1955	25,907	-	2	547	57	26,514	-	26,514	33,063	59,577
1956	33,615	-	-	617	44	34,275	-	34,275	38,573	72,848
1957	26,886	-	-	645	53	27,584	-	27,584	37,047	64,630
1958	20,009	-	-	531	28	20,568	-	20,568	30,629	51,197
1959	19,717	-	-	438	33	20,188	-	20,188	33,728	53,916
1960	17,309	-	-	349	77	17,735	-	17,735	34,160	51,895
1961	17,569	-	-	368	76	18,013	-	18,013	39,465	57,477
1962	17,448	9	-	414	62	17,933	-	17,933	37,194	55,127
1963	20,747	0	52	354	144	21,297	-	21,297	48,074	69,371
1964	32,455	0	33	566	81	33,136	-	33,136	66,410	99,546
1965	43,606	269	116	421	123	44,535	-	44,535	74,416	118,951
1966	45,026	160	134	454	149	45,923	-	45,923	93,467	139,390
1967	41,651	409	32	454	78	42,625	-	42,625	102,247	144,872
1968	43,993	2,301	18	517	84	46,913	-	46,913	87,186	134,099
1969	52,741	2,393	66	846	44	56,089	-	56,089	91,954	148,044
1970	56,238	2,392	182	769	60	59,641	-	59,641	69,450	129,091
1971	45,979	1,384	226	781	149	48,518	-	48,518	60,846	109,365
1972	53,519	1,486	48	809	104	55,966	-	55,966	97,531	153,496
1973	72,358	3,227	266	883	132	76,865	-	76,865	161,120	237,985
1974	100,259	4,009	216	2,121	267	106,871	-	106,871	134,783	241,655
1975	88,117	5,334	209	2,916	348	96,924	-	96,924	156,403	253,327
1976	89,513	4,354	1,553	2,505	258	98,183	8,810	106,993	199,343	306,336
1977	97,863	6,441	3,035	2,823	435	110,597	106,410	217,007	372,997	590,004
1978	106,938	17,903	92	2,343	292	127,568	143,406	270,974	465,459	736,433
1979	133,368	31,822	187	2,821	219	168,417	232,335	400,752	427,638	828,390
1980	127,779	52,709	89	3,363	662	184,602	282,999	467,601	446,712	914,313
1981	107,847	31,278	1,072	3,561	1,290	145,047	288,022	433,069	230,974	664,043
1982	130,685	30,366	3,060	3,406	1,866	169,383	378,973	548,356	217,946	766,302
1983	145,141	45,819	3,473	3,028	1,660	199,121	300,916	500,037	232,757	732,794
1984	166,188	47,060	4,725	2,174	3,478	223,625	417,159	640,784	231,578	872,362
1985	249,968	50,623	4,936	3,326	2,165	311,018	584,679	895,697	409,001	1,304,698
TOTAL	2,314,143	341,750	23,821	47,086	14,573	2,741,373	2,743,709	5,485,082	4,866,450	10,351,532

TABLE A.10 - SUMMARY OF GROSS VALUE OF MINERAL PRODUCTION AT CURRENT PRICES - R ' 000

YEAR	NON-FERROUS BASE METALS	PRECIOUS METALS	FERROUS BASE METALS	NON-METALLICS	ROCK & SEMI-PRECIOUS STONES	SUB-TOTAL	SOURCES OF ENERGY	TOTAL	PRECIOUS STONES	GRAND TOTAL
1950	8,681	1	-	203	5	8,890	-	8,890	14,334	23,224
1951	16,419	-	-	468	1	16,888	-	16,888	20,376	37,264
1952	20,410	-	-	550	3	20,963	-	20,963	23,071	44,034
1953	19,954	-	-	563	13	20,530	-	20,530	23,871	44,401
1954	20,274	-	12	564	50	20,900	-	20,900	26,838	47,738
1955	28,128	-	-	602	61	28,791	-	28,791	32,066	60,857
1956	35,308	-	-	752	39	36,099	-	36,099	39,707	75,806
1957	26,513	-	-	660	46	27,219	-	27,219	39,510	66,729
1958	18,739	-	-	627	34	19,400	-	19,400	35,913	55,313
1959	23,597	-	-	408	34	24,039	-	24,039	36,022	60,061
1960	18,040	-	-	460	78	18,578	-	18,578	34,639	53,217
1961	18,115	-	-	394	78	18,587	-	18,587	36,939	55,526
1962	22,464	9	-	403	77	22,953	-	22,953	40,508	63,461
1963	35,246	0	55	375	154	35,830	-	35,830	43,193	79,023
1964	32,208	60	59	539	101	32,967	-	32,967	67,033	100,000
1965	39,518	218	84	522	162	40,504	-	40,504	77,747	118,251
1966	49,778	160	134	370	163	50,605	-	50,605	97,011	147,616
1967	43,149	584	32	368	82	44,215	-	44,215	88,499	132,714
1968	51,721	2,301	18	493	124	54,657	-	54,657	94,338	148,995
1969	47,259	2,393	76	941	47	50,716	-	50,716	100,658	151,374
1970	58,784	2,392	182	1,076	64	62,498	-	62,498	79,808	142,306
1971	47,359	1,384	226	1,236	149	50,354	-	50,354	80,456	130,810
1972	56,603	1,486	48	1,345	105	59,587	-	59,587	109,585	169,172
1973	90,114	3,227	266	1,118	132	94,857	-	94,857	133,888	228,745
1974	133,140	4,009	216	2,372	370	140,107	116	140,223	141,377	281,600
1975	92,661	5,334	209	3,615	325	102,144	2,929	105,073	151,933	257,006
1976	94,892	4,354	1,553	3,287	242	104,328	20,956	125,284	205,140	330,424
1977	111,853	6,441	3,035	3,085	422	124,836	116,352	241,188	391,998	633,186
1978	109,163	17,902	92	2,553	324	130,034	135,781	265,815	393,053	658,868
1979	139,981	31,822	187	2,963	245	175,198	223,081	398,279	438,187	836,466
1980	123,398	36,584	89	3,328	665	164,064	279,530	443,594	473,320	916,914
1981	115,125	31,278	1,072	3,475	1,297	152,247	308,194	460,441	246,221	706,662
1982	137,537	26,830	3,060	3,644	1,861	172,932	354,745	527,677	213,359	741,036
1983	149,094	40,904	3,473	3,293	1,662	198,426	321,745	520,171	217,903	738,074
1984	160,101	37,295	4,725	2,036	3,858	208,015	411,203	619,218	236,446	855,664
1985	249,711	49,295	4,936	3,474	2,397	309,813	542,078	851,891	357,372	1,209,263
TOTAL	2,445,037	306,263	23,839	52,162	15,470	2,842,771	2,716,710	5,559,481	4,842,319	10,401,800

TABLE A.11 - SUMMARY OF GROSS VALUE OF MINERAL PRODUCTION AT CONSTANT 1975 PRICES - R ' 000

YEAR	NON-FERROUS BASE METALS	PRECIOUS METALS	FERROUS BASE METALS	NON-METAL-LICS	ROCK & SEMI-PRE-CIOUS STONES	SUB-TOTAL	SOURCES OF ENERGY	TOTAL	PRECIOUS STONES	GRAND TOTAL
1950	16,237	3	-	378	99	16,717	-	16,717	43,859	60,576
1951	21,266	-	-	665	10	21,941	-	21,941	43,718	65,659
1952	25,594	-	-	806	14	26,414	-	26,414	46,714	73,128
1953	24,746	-	-	595	56	25,397	-	25,397	53,048	78,445
1954	24,459	-	7	609	116	25,191	-	25,191	59,413	84,604
1955	33,151	-	-	690	174	34,015	-	34,015	70,650	104,665
1956	38,199	-	-	994	111	39,304	-	39,304	85,931	125,235
1957	42,003	-	-	1,012	123	43,138	-	43,138	86,653	129,791
1958	35,182	-	-	1,071	120	36,373	-	36,373	78,597	114,970
1959	34,423	-	-	836	92	35,351	-	35,351	80,907	116,258
1960	34,500	-	-	852	480	35,832	-	35,832	81,301	117,133
1961	32,513	-	-	853	194	33,560	-	33,560	78,731	112,291
1962	46,365	19	-	819	508	47,711	-	47,711	89,284	136,995
1963	64,479	0	51	744	557	65,831	-	65,831	103,836	169,667
1964	71,111	198	36	954	340	72,639	-	72,639	133,987	206,626
1965	79,983	700	91	934	560	82,268	-	82,268	143,955	226,223
1966	95,335	542	144	629	667	97,317	-	97,317	153,013	250,330
1967	80,871	1,610	35	662	166	83,344	-	83,344	147,965	231,309
1968	73,049	4,864	20	823	232	78,988	-	78,988	149,835	228,823
1969	71,971	6,031	82	1,427	191	79,702	-	79,702	178,381	258,083
1970	83,803	6,130	195	1,601	118	91,847	-	91,847	162,523	254,370
1971	85,057	4,374	240	1,877	549	92,097	-	92,097	143,562	235,659
1972	83,514	3,947	51	1,696	247	89,455	-	89,455	138,802	228,257
1973	99,406	5,334	283	1,769	276	107,068	-	107,068	139,111	246,179
1974	112,465	4,374	222	2,530	441	120,032	151	120,183	136,548	256,731
1975	92,661	5,334	209	3,615	328	102,147	2,929	105,076	151,933	257,009
1976	81,227	3,667	1,507	2,905	275	89,581	9,798	99,379	147,246	246,625
1977	99,173	4,911	2,862	2,288	401	109,635	35,377	145,012	173,965	318,977
1978	94,996	13,462	84	2,062	355	110,959	40,774	151,733	165,026	316,759
1979	86,014	12,904	167	2,042	190	101,317	57,951	159,268	143,658	302,926
1980	79,321	8,158	77	2,061	546	90,163	61,021	151,184	135,629	286,813
1981	79,301	11,601	908	1,892	779	94,481	60,067	154,548	108,701	263,249
1982	91,439	9,909	2,528	1,922	951	106,749	57,115	163,864	88,436	252,300
1983	93,227	10,609	2,778	1,436	1,271	109,321	56,211	165,532	84,172	249,704
1984	82,824	10,242	4,026	880	1,918	99,890	55,970	155,860	81,082	236,942
1985	86,093	11,151	4,096	1,482	1,057	103,879	51,165	155,044	81,676	236,720
TOTAL	2,375,958	140,074	20,699	48,411	14,512	2,599,654	488,529	3,088,183	3,991,848	7,080,031

TABLE A.12 - SUMMARY OF INDEX OF PHYSICAL VOLUME OF MINERAL PRODUCTION (1975 = 100)

YEAR	NON-FERROUS BASE METALS	PRECIOUS METALS	FERROUS BASE METALS	NON-METAL-LICS	ROCK AND SEMI-PRECIOUS STONES	TOTAL OTHER MINING	SOURCES OF ENERGY	TOTAL NON-DIAMOND MINING	PRECIOUS STONES	TOTAL MINING
WEIGHTS:	36.05	2.07	0.08	1.41	0.13	39.74	1.14	40.88	59.12	100.00
1950	17.5	0.1	0.0	10.5	30.2	16.4	0.0	15.9	28.9	23.6
1951	23.0	0.0	0.0	18.4	3.0	21.5	0.0	20.9	28.8	25.5
1952	27.6	0.0	0.0	22.3	4.3	25.9	0.0	25.1	30.7	28.5
1953	26.7	0.0	0.0	16.5	17.1	24.9	0.0	24.2	34.9	30.5
1954	26.4	0.0	3.3	16.8	35.4	24.7	0.0	24.0	39.1	32.9
1955	35.8	0.0	0.0	19.1	53.0	33.3	0.0	32.4	46.5	40.7
1956	41.2	0.0	0.0	27.5	33.8	38.5	0.0	37.4	56.6	48.7
1957	45.3	0.0	0.0	28.0	37.5	42.2	0.0	41.1	57.0	50.5
1958	38.0	0.0	0.0	29.6	36.6	35.6	0.0	34.6	51.7	44.7
1959	37.1	0.0	0.0	23.1	28.0	34.6	0.0	33.6	53.3	45.2
1960	37.2	0.0	0.0	23.6	146.3	35.1	0.0	34.1	53.5	45.6
1961	35.1	0.0	0.0	23.6	59.1	32.9	0.0	31.9	51.8	43.7
1962	50.0	0.4	0.0	22.7	154.9	46.7	0.0	45.4	58.8	53.3
1963	69.6	0.0	24.4	20.6	169.8	64.4	0.0	62.7	68.3	66.0
1964	76.7	3.7	17.2	26.4	103.7	71.1	0.0	69.1	88.2	80.4
1965	86.3	13.1	43.5	25.8	170.7	80.5	0.0	78.3	94.7	88.0
1966	102.9	10.2	68.9	17.4	203.4	95.3	0.0	92.6	100.7	97.4
1967	87.3	30.2	16.7	18.3	50.6	81.6	0.0	79.3	97.4	90.0
1968	78.8	91.2	9.6	22.8	70.7	77.3	0.0	75.2	98.6	89.0
1969	77.7	113.1	39.2	39.5	58.2	78.0	0.0	75.9	117.4	100.4
1970	90.4	114.9	93.3	44.3	36.0	89.9	0.0	87.4	107.0	99.0
1971	91.8	82.0	114.8	51.9	167.4	90.2	0.0	87.6	94.5	91.7
1972	90.1	74.0	24.4	46.9	75.3	87.6	0.0	85.1	91.4	88.8
1973	107.3	100.0	135.4	48.9	84.1	104.8	0.0	101.9	91.6	95.8
1974	121.4	82.0	106.2	70.0	134.5	117.5	5.2	114.4	89.9	99.9
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	87.7	68.7	721.1	80.4	83.8	87.7	334.5	94.6	96.9	96.0
1977	107.0	92.1	1369.4	63.3	122.3	107.3	1207.8	138.0	114.5	124.1
1978	102.5	252.4	40.2	57.0	108.2	108.6	1392.1	144.4	108.6	123.2
1979	92.8	241.9	79.9	56.5	57.9	99.2	1978.5	151.6	94.6	117.9
1980	85.6	152.9	36.8	57.0	166.5	88.3	2083.3	143.9	89.3	111.6
1981	85.6	217.5	434.4	52.3	237.5	92.5	2050.8	147.1	71.5	102.4
1982	98.7	185.8	1209.6	53.2	289.9	104.5	1950.0	155.9	58.2	98.2
1983	100.6	198.9	1329.2	39.7	387.5	107.0	1919.1	157.5	55.4	97.2
1984	89.4	192.0	1926.3	24.3	584.8	97.8	1910.9	148.3	53.4	92.2
1985	92.9	209.1	1959.8	41.0	322.3	101.7	1746.8	147.6	53.8	92.1

TABLE A.13 - INDEX OF PYSICAL VOLUME OF DIAMOND PRODUCTION

YEAR	DIAMONDS RECOVERED		AVERAGE WEIGHT PER DIAMOND RECOVERED		COMBINED INDEX*
	CARATS	INDEX: 1975=100	CARATS	INDEX: 1975=100	1975=100
1950	504,604	28.9	0.29	39.7	11.5
1951	502,983	28.8	0.73	100.0	28.8
1952	537,450	30.7	0.63	86.3	26.5
1953	610,332	34.9	0.59	80.8	28.2
1954	683,560	39.1	1.10	150.7	58.9
1955	812,848	46.5	0.97	132.9	61.8
1956	988,653	56.6	1.07	146.6	82.9
1957	996,965	57.0	1.04	142.5	81.3
1958	904,274	51.7	0.88	120.5	62.4
1959	930,852	53.3	0.87	119.2	63.5
1960	935,382	53.5	0.77	105.5	56.4
1961	905,815	51.8	0.86	117.8	61.0
1962	1,027,233	58.8	0.81	111.0	65.2
1963	1,194,650	68.3	0.80	109.6	74.9
1964	1,541,544	88.2	0.87	119.2	105.1
1965	1,656,234	94.7	0.96	131.5	124.6
1966	1,760,442	100.7	0.96	131.5	132.4
1967	1,702,362	97.4	0.91	124.7	121.4
1968	1,723,879	98.6	0.84	115.1	113.5
1969	2,052,308	117.4	0.65	89.0	104.5
1970	1,869,857	107.0	0.76	104.1	111.4
1971	1,651,707	94.5	0.88	120.5	113.9
1972	1,596,949	91.4	0.88	120.5	110.1
1973	1,600,497	91.6	0.88	120.5	110.4
1974	1,571,017	89.9	0.88	120.5	108.3
1975	1,748,016	100.0	0.73	100.0	100.0
1976	1,694,090	96.9	0.94	128.8	124.8
1977	2,001,504	114.5	0.72	98.6	112.9
1978	1,898,662	108.6	0.66	90.4	98.2
1979	1,652,817	94.6	0.70	95.9	90.7
1980	1,560,436	89.3	0.63	86.3	77.0
1981	1,250,629	71.5	0.61	83.6	59.8
1982	1,017,477	58.2	0.56	76.7	44.7
1983	968,414	55.4	0.61	83.6	46.3
1984	932,863	53.4	0.52	71.2	38.0
1985	939,702	53.8	0.51	69.9	37.6

* : Index of diamonds recovered multiplied by the index of average weight per diamond recovered, divided by 100.

TABLE A.14 - INDEX OF PHYSICAL VOLUME OF NON-FERROUS BASE METAL PRODUCTION (1975 = 100)

YEAR	COPPER	LEAD	ZINC	TIN	SUB-TOTAL	OTHER	TOTAL
WEIGHTS:	56.05	19.53	17.34	3.76	96.68	3.32	100.00
1950	7.0	41.9	24.7	9.6	17.3	23.6	17.5
1951	8.6	55.1	34.5	10.4	22.7	29.2	23.0
1952	10.6	66.8	37.3	13.5	26.9	49.2	27.6
1953	11.2	65.3	27.5	23.1	25.5	62.4	26.7
1954	10.7	59.6	34.8	29.6	25.6	49.1	26.4
1955	15.8	91.5	34.9	29.3	35.0	57.8	35.8
1956	19.3	97.6	39.0	57.1	40.1	72.8	41.2
1957	20.1	103.4	46.9	77.0	43.9	85.6	45.3
1958	18.5	94.0	32.9	20.4	36.4	82.6	38.0
1959	19.1	100.3	32.2	0.6	37.1	38.4	37.1
1960	17.8	95.7	32.3	29.8	36.6	55.8	37.2
1961	14.6	83.4	37.9	34.3	33.5	82.4	35.1
1962	22.2	106.1	56.9	43.2	46.2	162.3	50.0
1963	61.3	95.3	57.0	51.3	67.0	144.3	69.6
1964	69.1	135.1	52.5	56.3	79.0	11.6	76.7
1965	78.2	165.3	31.3	85.8	87.6	47.6	86.3
1966	84.7	222.3	41.4	66.1	104.0	70.2	102.9
1967	73.3	137.7	60.3	89.7	84.6	164.3	87.3
1968	73.7	110.6	47.3	123.7	78.3	93.0	78.8
1969	52.4	123.1	93.5	138.3	77.4	84.9	77.7
1970	67.9	132.1	110.3	135.3	91.1	70.8	90.4
1971	67.0	137.8	112.8	137.1	92.3	78.3	91.8
1972	70.7	133.1	102.6	112.1	90.7	74.3	90.1
1973	97.1	140.1	106.4	105.4	107.8	93.0	107.3
1974	121.2	138.6	105.9	117.0	121.8	108.0	121.4
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	79.7	97.9	96.8	122.0	88.1	75.2	87.7
1977	116.9	100.1	83.0	145.2	108.5	63.8	107.0
1978	102.0	92.6	108.5	159.0	103.5	74.1	102.5
1979	93.6	94.9	88.1	133.8	94.4	45.8	92.8
1980	87.6	97.8	67.2	118.3	87.2	39.2	85.6
1981	87.0	95.8	77.2	108.0	87.8	20.9	85.6
1982	110.5	94.1	73.5	116.7	100.8	36.8	98.7
1983	118.4	91.7	64.9	121.5	103.6	14.5	100.6
1984	104.2	71.7	65.2	133.2	91.8	20.4	89.4
1985	103.9	88.9	65.7	132.0	95.1	28.8	92.9

TABLE A.15 – MINING'S PRODUCTION ACCOUNTS – R millions

YEAR	GROSS INPUT: INTERMEDIATE INPUT	GROSS INPUT: GROSS VALUE ADDED: REMUNERATION OF EMPLOYEES	GROSS INPUT: GROSS VALUE ADDED: PROVISION FOR DEPRECIATION	GROSS INPUT: GROSS VALUE ADDED: NET OPERATING SURPLUS	GROSS INPUT: GROSS VALUE ADDED: TOTAL GROSS VALUE ADDED	GROSS INPUT: NET INDIRECT TAXES	GROSS INPUT: TOTAL GROSS INPUT	GROSS OUTPUT: FINAL OUTPUT: EXPORTS	GROSS OUTPUT: FINAL OUTPUT: CONSUMPTION	GROSS OUTPUT: FINAL OUTPUT: CHANGE IN INVENTORIES	GROSS OUTPUT: FINAL OUTPUT: TOTAL FINAL OUTPUT	GROSS OUTPUT: INTERMEDIATE OUTPUT	GROSS OUTPUT: TOTAL GROSS OUTPUT
A. TOTAL MINING													
1970	24.6	25.8	5.2	72.0	103.0	7.4	135.0	127.2	0.0	5.9	133.1	1.9	135.0
1971	25.2	29.2	5.4	49.5	84.1	8.3	117.6	107.5	0.0	8.1	115.6	2.0	117.6
1972	33.9	27.4	5.8	79.5	112.7	10.1	156.7	147.8	0.0	3.1	150.9	5.8	156.7
1973	37.6	31.8	6.8	147.8	186.4	15.6	239.6	226.1	0.0	1.5	227.6	12.0	239.6
1974	69.1	44.0	9.3	115.8	169.1	14.7	252.9	229.9	0.1	10.8	240.8	12.1	252.9
1975	67.4	54.5	12.5	107.2	174.2	13.6	255.2	241.3	0.1	1.0	242.4	12.8	255.2
1976	109.4	77.1	17.4	120.6	215.1	23.1	347.6	298.1	0.1	40.0	338.2	9.4	347.6
1977	203.8	101.2	21.8	265.8	388.8	21.7	614.3	581.0	0.1	23.1	604.2	10.1	614.3
1978	136.2	105.3	25.6	400.4	531.3	51.0	718.5	730.2	0.1	-19.9	710.4	8.1	718.5
1979	217.3	122.5	29.3	432.5	584.3	49.2	850.8	821.0	0.1	20.1	841.2	9.6	850.8
1980	253.2	140.7	32.2	457.1	630.0	51.9	935.1	908.4	0.2	17.2	925.8	9.3	935.1
1981	238.1	163.1	37.7	253.6	454.4	27.2	719.7	657.4	0.3	51.4	709.1	10.6	719.7
1982	262.9	167.1	40.6	257.4	465.1	26.0	754.0	758.5	0.3	-15.5	743.3	10.7	754.0
1983	232.1	189.1	42.3	241.9	473.3	30.2	735.6	720.3	0.3	-1.4	719.2	16.4	735.6
1984	356.9	188.1	43.6	278.7	510.4	26.4	893.7	857.9	0.4	19.1	877.4	16.3	893.7
1985	370.2	212.7	44.7	650.7	908.1	46.2	1324.5	1283.4	0.5	15.9	1299.8	24.7	1324.5
B. DIAMOND MINING													
1970	15.3	12.0	1.8	38.9	52.7	6.9	74.9	69.4	–	5.5	74.9	–	74.9
1971	7.8	12.2	1.8	35.5	49.5	7.7	65.0	60.9	–	4.1	65.0	–	65.0
1972	7.4	10.8	2.2	68.4	81.4	9.5	98.3	97.5	–	0.8	98.3	–	98.3
1973	2.6	14.0	2.6	123.6	140.2	14.9	157.7	161.1	–	-3.4	157.7	–	157.7
1974	28.5	17.0	4.0	81.2	102.2	13.9	144.6	134.8	–	9.8	144.6	–	144.6
1975	19.4	23.4	5.1	94.0	122.5	12.7	154.6	156.4	–	-1.8	154.6	–	154.6
1976	32.9	27.9	6.7	114.3	148.9	21.9	203.7	199.3	–	4.4	203.7	–	203.7
1977	82.7	32.8	8.4	232.5	273.7	20.2	376.6	373.0	–	3.6	376.6	–	376.6
1978	22.0	40.3	10.2	339.4	389.9	49.3	461.2	465.5	–	-4.3	461.2	–	461.2
1979	44.2	50.2	11.1	284.9	346.2	47.1	437.5	427.6	–	9.9	437.5	–	437.5
1980	44.5	55.4	13.3	295.9	364.6	49.8	458.9	446.7	–	12.2	458.9	–	458.9
1981	40.6	62.0	14.4	109.9	186.3	24.3	251.2	231.0	–	20.2	251.2	–	251.2
1982	45.6	53.5	14.8	74.8	143.1	22.5	211.2	217.9	–	-6.7	211.2	–	211.2
1983	25.0	58.7	15.1	101.1	174.9	26.3	226.2	234.7	–	-8.5	226.2	–	226.2
1984	54.6	59.9	15.3	80.5	155.7	23.2	233.5	231.6	–	1.9	233.5	–	233.5
1985	28.0	67.8	15.6	247.1	330.5	41.7	400.2	409.0	–	-8.8	400.2	–	400.2
C. NON-DIAMOND MINING													
1970	9.3	13.8	3.4	33.1	50.3	0.5	60.1	57.8	0.0	0.4	58.2	1.9	60.1
1971	17.4	17.0	3.6	14.0	34.6	0.6	52.6	46.6	0.0	4.0	50.6	2.0	52.6
1972	26.5	16.6	3.6	11.1	31.3	0.6	58.4	50.3	0.0	2.3	52.6	5.8	58.4
1973	35.0	17.8	4.2	24.2	46.2	0.7	81.9	65.0	0.0	4.9	69.9	12.0	81.9
1974	40.6	27.0	5.3	34.6	66.9	0.8	108.3	95.1	0.1	1.0	96.2	12.1	108.3
1975	48.0	31.1	7.4	13.2	51.7	0.9	100.6	84.9	0.1	2.8	87.8	12.8	100.6
1976	76.5	49.2	10.7	6.3	66.2	1.2	143.9	98.8	0.1	35.6	134.5	9.4	143.9
1977	121.1	68.4	13.4	33.3	115.1	1.5	237.7	208.0	0.1	19.5	227.6	10.1	237.7
1978	114.2	65.0	15.4	61.0	141.4	1.7	257.3	264.7	0.1	-15.6	249.2	8.1	257.3
1979	173.1	72.3	18.2	147.6	238.1	2.1	413.3	393.4	0.1	10.2	403.7	9.6	413.3
1980	208.7	85.3	18.9	161.2	265.4	2.1	476.2	461.7	0.2	5.0	466.9	9.3	476.2
1981	197.5	101.1	23.3	143.7	268.1	2.9	468.5	426.4	0.3	31.2	457.9	10.6	468.5
1982	217.3	113.6	25.8	182.6	322.0	3.5	542.8	540.6	0.3	-8.8	532.1	10.7	542.8
1983	207.1	130.4	27.2	140.8	298.4	3.9	509.4	485.6	0.3	7.1	493.0	16.4	509.4
1984	302.3	128.2	28.3	198.2	354.7	3.2	660.2	626.3	0.4	17.2	643.9	16.3	660.2
1985	342.2	144.9	29.1	403.6	577.6	4.5	924.3	874.4	0.5	24.7	899.6	24.7	924.3

TABLE A.16 - INPUT-OUTPUT TABLE AT BASIC VALUES, 1980 - R ' 000

INPUTS \ OUTPUTS	SECTOR 01	SECTOR 02	SECTOR 03	SECTOR 04	SECTOR 05	SECTOR 06	SECTOR 07	SECTOR 08	SECTOR 09	SECTOR 10	SECTOR 11	SECTOR 12	SECTOR 13	SECTOR 14	SECTOR 15	SECTOR 16	SECTOR 17	SECTOR 18	SECTOR 19	SECTOR 20	SECTOR 21	SECTOR 22	SECTOR 23	SECTOR 24	SECTOR 25
SECTOR01	4,200	-	-	-	474	-	-	854	42,809	5,266	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR02	-	1,900	-	-	102	-	-	184	4,725	-	-	-	-	-	-	-	-	-	800	-	-	-	-	-	-
SECTOR03	7,215	3,099	706	-	804	-	833	618	4,276	-	-	1,902	8,980	-	369	939	2,436	-	-	-	-	266	-	-	-
SECTOR04	-	-	100	-	-	-	-	-	-	-	3,079	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR06	-	-	-	-	-	-	-	2,924	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR08	596	283	-	-	-	-	2,043	4,905	-	-	70	-	-	-	-	-	-	-	-	-	70	-	-	-	-
SECTOR09	-	-	-	-	-	-	-	-	6,048	-	-	-	-	158	14	57	-	-	-	-	1,779	-	-	-	-
SECTOR10	-	-	-	-	-	-	-	-	147	2,117	-	8	25	133	14	7	3	-	-	-	-	-	-	-	-
SECTOR11	200	100	-	-	-	-	-	-	-	-	-	-	-	-	-	1,000	-	-	-	-	-	-	-	-	-
SECTOR12	-	-	-	-	3	-	14	-	151	13	49	733	16	497	30	108	28	-	-	-	-	1	-	-	-
SECTOR13	967	1,612	40	-	-	-	-	-	690	-	20	531	282	4,016	9	70	1,170	-	-	-	-	-	-	-	-
SECTOR14	-	-	-	-	-	-	-	-	-	6	33	-	-	256	3	-	-	-	-	-	-	-	-	-	-
SECTOR15	-	-	-	-	-	-	-	-	385	92	639	16	79	816	233	6	289	1,046	-	-	-	-	-	-	-
SECTOR16	3,658	1,156	568	-	9	-	33	18	542	-	-	17	1,353	-	-	649	41	-	-	-	-	-	-	-	-
SECTOR17	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2	2,347	-	-	-	-	-	-	-	-
SECTOR18	-	-	-	-	19	-	-	-	-	-	-	-	-	10	1	-	-	40	-	-	-	-	-	-	-
SECTOR19	-	1,505	430	586	130	-	1,371	403	23	5	108	6	393	8	1	19	53	-	553	1,126	90	75	-	24	-
SECTOR20	-	-	-	29	103	-	736	225	19	1	6	1	5	7	1	1	4	2	-	92	3	5	-	42	-
SECTOR21	-	-	-	-	72	-	119	62	-	-	-	-	-	-	-	-	-	-	-	22	86	-	-	1	-
SECTOR22	48	56	272	-	168	-	283	161	7	6	13	1	1	5	3	-	63	92	1	4	11	742	-	2	-
SECTOR23	18	15	29	-	44	-	-	81	209	69	374	58	105	224	79	4	1,028	22	2	16	44	11	3	1,264	-
SECTOR24	47	15	1	-	-	-	-	-	63	30	18	44	28	36	23	7	389	115	14	20	5	12	-	436	-
SECTOR25	1,073	1,164	1,480	-	12	-	-	28	39	10	37	2	5	7	2	1	35	2	1	-	3	1	-	2	-
SECTOR26	102	33	3	58	150	-	798	313	508	33	39	62	45	201	48	10	144	53	154	54	89	72	2	57	-
SECTOR27	114	119	43	29	1,598	-	1,950	2,160	-	-	-	-	-	-	-	-	4	-	46	3	7	23	-	-	-
SECTOR28	2,224	1,469	394	879	2,941	-	7,545	5,074	268	31	377	122	87	409	29	58	401	113	27	7	243	64	-	58	-
SECTOR29	386	122	12	293	1,723	-	8,999	5,941	81	10	28	26	18	45	12	28	37	36	2	1	66	92	-	209	-
SECTOR30	143	45	5	-	134	-	670	392	69	4	31	37	2	3	9	134	612	204	-	1	2	25	-	1	-
SECTOR31	107	119	4	-	365	-	3,886	962	-	3	-	-	23	6	3	-	-	-	-	-	3	38	-	14	-
SECTOR32	64	72	2	-	56	-	143	40	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-
SECTOR33	280	314	10	-	2,196	-	10,491	3,553	332	66	1,170	64	13	51	14	6	1,288	191	3	4	40	55	-	35	-
SECTOR34	618	693	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR35	-	-	-	70	6,443	-	18,489	15,387	99	11	150	36	39	58	7	3	133	23	5	5	13	32	-	50	-
SECTOR36	-	-	-	30	829	-	4,003	1,445	3	-	4	1	-	1	-	-	7	1	-	-	-	-	-	-	-
SECTOR37	-	-	-	40	84	-	183	65	-	-	-	-	-	3	-	-	-	-	-	-	-	1	-	-	-
SECTOR38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR39	256	287	9	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-	-	-	-	1	-	-	-
SECTOR40	56	62	2	200	44	-	3,141	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR41	-	-	-	-	218	-	1,112	231	2	-	1	-	-	4	1	-	-	-	3	41	38	1	-	57	-
SECTOR42	441	140	14	-	7,515	-	10,038	12,150	2,352	108	139	48	421	26	19	41	732	98	24	7	14	96	2	114	-
SECTOR43	129	41	4	-	-	-	149	10	95	6	6	2	15	3	-	2	123	95	1	-	2	3	-	3	-
SECTOR44	214	249	34	-	-	-	-	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR45	52	61	8	-	-	-	81	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR46	4,312	2,848	765	394	4,851	-	7,597	8,442	608	45	382	165	178	261	35	64	670	126	58	35	79	122	1	242	-
SECTOR47	1,969	1,300	349	80	1,090	-	4,221	3,290	4,215	120	484	256	700	483	59	78	513	150	30	28	48	62	1	153	-
SECTOR48	86	71	10	82	758	-	1,020	907	87	40	61	6	8	78	3	5	114	24	13	4	19	19	-	45	-
SECTOR49	2,523	2,252	375	160	12,497	-	28,843	16,203	1,835	261	995	386	709	924	154	52	2,118	468	175	202	269	361	1	854	-
SUBTOTAL:																									
INTERMEDIATE INPUTS	32,098	21,202	5,692	2,930	45,432	-	118,791	87,475	70,691	8,353	8,313	4,530	13,530	8,732	1,175	3,351	14,782	2,901	1,912	1,672	3,023	2,187	10	3,663	-
REMUNERATION OF EMPLOYEES	12,200	5,800	1,900	8,100	55,354	-	40,727	44,572	7,684	562	3,717	161	75	2,229	368	225	2,411	426	165	208	223	873	4	2,839	-
GROSS OPERATING SURPLUS	61,000	28,900	9,400	4,700	309,223	-	128,287	51,794	5,944	235	394	105	13	866	77	135	4,682	942	28	76	38	428	1	272	-
NET INDIRECT TAXES	(2,061)	(1,102)	(319)	40	48,916	-	2,275	1,496	(199)	36	45	12	4	147	20	16	315	61	-	-	-	6	-	22	-
TOTAL INPUTS	103,237	54,800	16,673	15,770	458,925	0	290,080	185,337	84,120	9,186	12,469	4,808	13,622	11,974	1,640	3,727	22,190	4,330	2,105	1,956	3,284	3,494	15	6,796	-

TABLE A.16 - INPUT-OUTPUT TABLE, 1980 - R ' 000 / continued

INPUTS \ OUTPUTS	SECTOR 26	SECTOR 27	SECTOR 28	SECTOR 29	SECTOR 30	SECTOR 31	SECTOR 32	SECTOR 33	SECTOR 34	SECTOR 35	SECTOR 36	SECTOR 37	SECTOR 38	SECTOR 39	SECTOR 40	SECTOR 41	SECTOR 42	SECTOR 43	SECTOR 44	SECTOR 45	SECTOR 46	SECTOR 47	SECTOR 48	SECTOR 49
SECTOR01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.633	-	-	-
SECTOR04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	743	-	-	-	-	-	-	-	-
SECTOR06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.922	-	-	-	-	-	-	-
SECTOR07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SECTOR08	-	-	-	143	817	-	-	-	-	-	-	-	-	-	-	132	-	-	1.470	1.950	-	-	-	-
SECTOR09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.719	174	-	537
SECTOR10	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1.794	73	1	198
SECTOR11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	246	23	-	31
SECTOR12	4	-	-	241	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	88	4	-	-
SECTOR13	-	-	-	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	336	28	-	37
SECTOR14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	190	17	-	61
SECTOR15	-	-	-	34	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.167	108	1	158
SECTOR16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-
SECTOR17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.474	27	-	35
SECTOR18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.739	92	-	-
SECTOR19	4	79	-	174	14	-	3	81	-	5	1	-	2	19	-	2	18	-	1.412	10	646	381	109	272
SECTOR20	-	-	-	6	2	-	7	5	-	-	-	-	-	1	-	-	5	4	1	141	521	259	16	373
SECTOR21	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	24	28	101	40
SECTOR22	-	1	-	40	30	-	32	25	1	4	1	-	-	5	2	1	60	6	6.107	648	1.377	257	73	554
SECTOR23	3	3	-	385	57	-	4	41	-	4	1	-	-	44	-	1	80	5	21	19	6.252	318	111	3.222
SECTOR24	2	3	-	157	20	-	19	20	-	11	-	-	1	12	-	-	118	20	181	81	5,372	737	1,392	3,921
SECTOR25	-	-	-	9	8	-	4	4	-	1	-	-	-	2	-	-	136	6	-	11	595	395	148	1.301
SECTOR26	47	102	-	1,335	72	-	15	174	-	17	4	-	1	43	1	2	7	-	2.013	248	368	16	-	812
SECTOR27	-	-	-	-	1	-	9	11	2	3	3	-	3	2	-	-	12	3	15	101	595	849	116	3.766
SECTOR28	192	48	-	4,926	177	-	133	252	2	25	3	-	1	28	1	-	738	144	1,429	3,709	6,277	9,136	1,487	2.219
SECTOR29	7	-	-	1,217	11	-	102	209	2	39	-	-	2	17	1	-	123	36	2,573	599	1,353	334	124	2,385
SECTOR30	4	-	-	56	1,343	-	254	64	1	18	1	-	2	23	6	1	16	28	22,556	9.182	553	327	95	385
SECTOR31	1	9	-	196	253	-	5,180	4,186	82	254	19	-	10	706	10	-	682	4	6,641	3,576	317	690	-	24
SECTOR32	-	-	-	-	18	-	1,146	12	-	-	-	-	-	-	2	-	-	10	10,438	5,781	180	6	-	75
SECTOR33	3	13	-	408	69	-	289	550	11	43	5	-	3	128	3	2	92	107	745	203	545	273	265	381
SECTOR34	-	-	-	-	-	-	-	-	47	-	-	-	-	-	-	-	-	-	-	-	28	2	-	5
SECTOR35	3	6	-	107	91	-	70	135	1	121	-	-	1	32	3	-	267	19	839	2.889	2.170	193	96	618
SECTOR36	-	-	-	2	1	-	56	16	2	90	5	-	1	41	2	-	1.363	3	5,349	280	255	121	148	130
SECTOR37	-	-	-	-	-	-	1	1	-	2	-	-	-	-	-	-	7	2	58	-	53	121	1,035	51
SECTOR38	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
SECTOR39	-	-	-	-	-	-	-	-	-	-	-	-	47	561	-	-	141	12	-	10	2.008	3.041	504	1.621
SECTOR40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	25	19	8	70	10	6.465	39	6
SECTOR41	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	22	105	35	11	67	562	288	71	2.845
SECTOR42	14	12	-	209	258	-	235	400	9	33	2	-	2	87	2	2	11.113	906	75	10	2.378	319	674	3.537
SECTOR43	1	5	-	14	12	-	8	10	-	1	-	-	-	4	-	-	83	-	6	8	320	128	154	2.111
SECTOR44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	1	22.356	-	2.361	63	-	1.322
SECTOR45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	645	1	58	9.339	52	634	-	550
SECTOR46	27	20	-	894	254	-	306	299	7	67	3	-	7	106	3	33	2,354	65	5,263	2.912	24,199	6,620	2,550	11.022
SECTOR47	15	17	-	536	377	-	397	333	7	42	1	-	3	76	2	8	3.925	68	5.727	5.725	18.755	13,120	477	6,345
SECTOR48	3	3	-	63	22	-	42	32	1	7	-	-	-	23	1	1	319	39	258	886	5,119	648	1,702	4,586
SECTOR49	59	62	-	1,299	433	-	796	608	11	138	4	-	4	437	12	14	1.096	2.488	4.153	13.787	36,185	5,805	1,267	26,191
SUBTOTAL:																								
INTERMEDIATE INPUTS	389	383	-	12,510	4,344	-	9,108	7,470	186	925	53	-	92	2,398	64	964	37,486	4,031	99,763	62,263	131,816	52,120	12,756	81,727
REMUNERATION OF EMPLOYEES	129	146	-	1,668	2,533	-	4,305	1,692	20	308	22	-	13	1,110	86	95	6,590	482	13,151	22,209	85,632	58,010	8,860	65,171
GROSS OPERATING SURPLUS	45	(120)	-	3,098	869	-	373	2,615	39	125	0	-	7	817	8	146	17,596	1,606	4,490	10,786	80,704	8,048	1,735	48,863
NET INDIRECT TAXES	-	-	-	31	25	-	34	31	-	-	-	-	-	14	-	234	400	25	300	215	1,046	711	100	7,010
TOTAL INPUTS	563	409	-	17,307	7,771	-	13,820	11,808	245	1,358	75	-	112	4,339	158	1,439	62,072	6,144	117,704	95,473	299,198	118,889	23,451	202,771

TABLE A.16 - INPUT-OUTPUT TABLE, 1980 - R ' 000 / concluded

INPUTS \ OUTPUTS	INTM-TOT.	PRIV. CONS.	GOVT. CONS.	FIXED INV.	CHANGE INVENT.	EXPORT	TOTAL FINAL DEMAND	TOTAL DEMAND	IMPORTS	TOTAL OUTPUTS
SECTOR01	53.603	9.125	223	-	(13,800)	59,652	55,200	108,803	(5,566)	103,237
SECTOR02	7,711	3,622	131	-	(700)	44,036	47,089	54,800	-	54,800
SECTOR03	34.076	13,857	1,031	-	_	5,110	19,998	54,074	(37,401)	16,673
SECTOR04	3,179	633	_	-	-	13,081	13,714	16,893	(1,123)	15,770
SECTOR05	743	-	-	-	12,213	446,712	458,925	459,668	(743)	458,925
SECTOR06	16,846	-	50	-	-	-	50	16,896	(16,896)	-
SECTOR07	-	-	-	-	7,081	282,999	290,080	290,080	-	290,080
SECTOR08	12,479	170	-	-	(3,009)	178,689	175,850	188,329	(2,992)	185,337
SECTOR09	11,486	29,896	2,011	-	530	41,333	73,770	85,256	(1,136)	84,120
SECTOR10	4,528	5,901	502	-	190	540	7,133	11,661	(2,475)	9,186
SECTOR11	1,600	3,618	108	-	640	7,803	12,169	13,769	(1,300)	12,469
SECTOR12	1,983	2,547	17	-	(460)	1,240	3,344	5,327	(519)	4,808
SECTOR13	9,862	15,675	213	-	1,260	450	17,598	27,460	(13,838)	13,622
SECTOR14	566	11,691	335	-	90	1,080	13,196	13,762	(1,788)	11,974
SECTOR15	5,071	15,026	724	-	5,180	1,160	22,090	27,161	(25,521)	1,640
SECTOR16	8,059	122	76	-	690	10	898	8,957	(5,230)	3,727
SECTOR17	4,887	10,786	13	-	2,120	5,630	18,549	23,436	(1,246)	22,190
SECTOR18	1,901	16,613	37	-	560	630	17,840	19,741	(15,411)	4,330
SECTOR19	10,141	12,647	1,095	-	1,890	230	15,862	26,003	(23,898)	2,105
SECTOR20	2,623	19,074	2,048	-	1,870	1,500	24,492	27,115	(25,159)	1,956
SECTOR21	557	9,049	32	-	410	2,330	11,821	12,378	(9,094)	3,284
SECTOR22	11,163	7,261	2,327	219	906	670	11,383	22,546	(19,052)	3,494
SECTOR23	14,270	709	494	-	(30)	-	1,173	15,443	(15,428)	15
SECTOR24	13,370	3,604	4,040	-	200	383	8,227	21,597	(14,801)	6,796
SECTOR25	6,524	709	1,214	-	1,200	-	3,123	9,647	(9,647)	-
SECTOR26	8,305	2,959	88	-	2,090	-	5,137	13,442	(12,879)	563
SECTOR27	11,587	855	496	1,412	360	-	3,123	14,710	(14,301)	409
SECTOR28	53,747	14,597	8,515	-	140	-	23,252	76,999	(76,999)	-
SECTOR29	27,301	16,880	17,594	-	1,260	-	35,734	63,035	(45,728)	17,307
SECTOR30	37,438	1,201	1,243	-	820	-	3,264	40,702	(32,931)	7,771
SECTOR31	28,373	-	436	-	1,720	-	2,156	30,529	(30,529)	-
SECTOR32	18,052	-	699	19,195	1,600	350	21,844	39,896	(26,076)	13,820
SECTOR33	24,314	3,034	2,849	15,333	2,150	536	23,902	48,216	(36,408)	11,808
SECTOR34	1,416	64	197	4,824	810	-	5,895	7,311	(7,066)	245
SECTOR35	48,714	3,567	7,156	65,680	4,730	-	81,133	129,847	(128,489)	1,358
SECTOR36	14,189	1,401	732	17,172	2,510	-	21,815	36,004	(35,929)	75
SECTOR37	1,707	5,372	7,763	13,060	1,300	-	27,495	29,202	(29,202)	-
SECTOR38	2	21,887	8,742	18,272	(2,260)	-	46,641	46,643	(46,531)	112
SECTOR39	8,503	6,230	1,992	-	2,650	-	10,872	19,375	(15,036)	4,339
SECTOR40	10,435	1,631	13,576	9,364	340	-	24,911	35,346	(35,188)	158
SECTOR41	5,736	6,056	5,456	5,190	349	-	17,051	22,787	(21,348)	1,439
SECTOR42	54,816	12,415	2,424	-	270	-	15,109	69,925	(7,853)	62,072
SECTOR43	3,554	1,534	1,056	-	-	-	2,590	6,144	-	6,144
SECTOR44	26,748	-	4,339	121,860	-	-	126,199	152,947	(35,243)	117,704
SECTOR45	11,521	-	2,424	109,308	-	-	111,732	123,253	(27,780)	95,473
SECTOR46	89,291	158,633	10,175	20,620	22,550	14,011	225,989	315,280	(16,082)	299,198
SECTOR47	75,635	39,406	12,146	1,244	5,480	18,181	76,457	152,092	(33,203)	118,889
SECTOR48	17,215	4,772	2,570	-	-	572	7,914	25,129	(1,678)	23,451
SECTOR49	167,466	118,482	(14,776)	3,315	-	7,475	114,496	281,962	(79,191)	202,771
SUBTOTAL:										
INTERMEDIATE INPUTS	983,293	613,311	114,613	426,068	67,900	1,136,393	2,358,285	3,341,578	(1,045,934)	2,295,644
REMUNERATION OF EMPLOYEES	463,055	18,617	129,728	-	-	-	148,345	611,400	-	611,400
GROSS OPERATING SURPLUS	789,390	-	9,110	-	-	-	9,110	798,500	-	798,500
NET INDIRECT TAXES	59,906	48,072	4,270	9,332	-	(4,093)	57,581	117,487	-	117,487
TOTAL INPUTS	2,295,644	680,000	257,721	435,400	67,900	1,132,300	2,573,321	4,868,965	(1,045,934)	3,823,031

SECTOR NUMBER	SPECIFICATION OF: SECTOR/INDUSTRY/PRODUCT	SIC-CODE
SECTOR01	CATTLE FARMING	111a
SECTOR02	SHEEP AND GOAT FARMING	111b
SECTOR03	OTHER AGRICULTURE AND FORESTRY	111c,113
SECTOR04	FISHING	13
SECTOR05	DIAMOND MINING	27
SECTOR06	COAL MINING	21
SECTOR07	URANIUM MINING	24
SECTOR08	OTHER MINING	OTHER 2
SECTOR09	MEAT PROCESSING	3111
SECTOR10	DAIRY PROCUCTS	3112
SECTOR11	FISH PROCESSING	3114
SECTOR12	VEGETABLE AND ANIMAL OILS AND FATS	3115
SECTOR13	GRAIN MILL PRODUCTS	3115
SECTOR14	BAKERY PRODUCTS	3117
SECTOR15	OTHER FOOD PRODUCTS	3113,3118,3119,3121
SECTOR16	PREPARED ANIMAL FEEDS	3122
SECTOR17	MALT LIQUORS AND MALT	3133
SECTOR18	OTHER BEVERAGES AND TOBACCO	3131,3134,314
SECTOR19	TEXTILES	321
SECTOR20	WEARING APPAREL, EXCEPT FOOTWEAR	322
SECTOR21	TANNERIES, LEATHER PRODUCTS AND FOOTWEAR	323,324
SECTOR22	WOOD, WOOD PRODUCTS AND FURNITURE	331,332
SECTOR23	PULP, PAPER AND PAPER PRODUCTS	341
SECTOR24	PRINTING AND PUBLISHING	342
SECTOR25	FERTILIZERS AND PESTICIDES	3512
SECTOR26	PLASTIC MATERIALS AND MAN-MADE FIBRES	3513,356
SECTOR27	RUBBER PRODUCTS	3551,3559
SECTOR28	BASIC CHEMICAL PRODUCTS, PETROLEUM AND COAL PRODUCTS	351,353,354
SECTOR29	PAINTS, CLEANING COMPOUNDS AND OTHER CHEMICAL PRODUCTS	3521,3522,3523,3529
SECTOR30	NON-METALLIC MINERAL PRODUCTS	361,362,369
SECTOR31	BASIC METAL INDUSTRIES	371,372
SECTOR32	STRUCTURAL METAL PRODUCTS	3813
SECTOR33	OTHER FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENT	3811,3812,3819
SECTOR34	AGRICULTURAL MACHINERY AND EQUIPMENT	3822
SECTOR35	OTHER MACHINERY, EXCEPT ELECTRICAL	382, EXCEPT 3822
SECTOR36	ELECTRICAL MACHINERY, APPARATUS AND SUPPLIES	3831,3839
SECTOR37	RADIO AND TV EQUIPMENT, ELECTRICAL APPLIANCES AND HOUSEWARES	3832,3833
SECTOR38	MOTOR VEHICLES	38400,38401
SECTOR39	MOTOR VEHICLE PARTS AND ACCESSORIES	38402,38403,38409
SECTOR40	OTHER TRANSPORT EQUIMENT	385
SECTOR41	OTHER MANUFACTURING INDUSTRIES	386,39
SECTOR42	ELECTRICITY SUPPLY	41
SECTOR43	WATER SUPPLY	42
SECTOR44	BUILDING CONSTRUCTION	51
SECTOR45	CIVIL ENGINEERING AND OTHER CONSTRUCTION	52
SECTOR46	WHOLESALE AND RETAIL TRADE, CATERING AND ACCOMMODATION	6
SECTOR47	TRANSPORT	71
SECTOR48	COMMUNICATION	72
SECTOR49	OTHER SERVICES (INCLUDING SALES OF GOODS AND SERVICES BY GOVERNMENT)	8,9

ABBREVIATIONS:
- INTM-TOT. = Total intermediate outputs;
- PRIV.CONS. = Private consumption expenditure;
- GOVT.CONS. = Consumption expenditure of general government;
- FIXED INV. = Gross domestic fixed investment;
- CHANGE INVENT. = Change in inventories;
- EXPORT/IMPORT = Export/Import of goods and non-factor services.

TABLE A.17 - GROSS VALUE ADDED IN MINING AT CURRENT PRICES - R million

YEAR	DIAMOND MINING			URANIUM MINING			OTHER MINING			TOTAL MINING		
	W	S	T	W	S	T	W	S	T	W	S	T
1950	1.6	9.0	10.6	-	-	-	1.6	5.1	6.7	3.2	14.1	17.3
1951	1.9	14.2	16.1	-	-	-	2.1	11.4	13.5	4.0	25.6	29.6
1952	2.2	15.9	18.1	-	-	-	2.7	11.8	14.5	4.9	27.7	32.6
1953	3.0	15.1	18.1	-	-	-	3.1	11.8	14.9	6.1	26.9	33.0
1954	3.9	16.4	20.3	-	-	-	2.6	11.6	14.2	6.5	28.0	34.5
1955	4.3	19.9	24.2	-	-	-	3.3	21.8	25.1	7.6	41.7	49.3
1956	4.9	24.9	29.8	-	-	-	3.6	26.6	30.2	8.5	51.5	60.0
1957	4.8	23.2	28.0	-	-	-	3.7	19.3	23.0	8.5	42.5	51.0
1958	5.0	18.3	23.3	-	-	-	3.1	16.5	19.6	8.1	34.8	42.9
1959	5.3	19.5	24.8	-	-	-	2.7	20.3	23.0	8.0	39.8	47.8
1960	5.4	18.9	24.3	-	-	-	3.1	12.2	15.3	8.5	31.1	39.6
1961	5.6	23.4	29.0	-	-	-	3.5	11.3	14.8	9.1	34.7	43.8
1962	5.5	23.4	28.9	-	-	-	4.0	15.3	19.3	9.5	38.7	48.2
1963	6.5	32.1	38.6	-	-	-	4.6	14.6	19.2	11.1	46.7	57.8
1964	7.4	44.1	51.5	-	-	-	6.2	25.6	31.8	13.6	69.7	83.3
1965	8.3	51.9	60.2	-	-	-	7.4	28.1	35.5	15.7	80.0	95.7
1966	7.9	67.3	75.2	-	-	-	7.2	34.3	41.5	15.1	101.6	116.7
1967	10.8	65.5	76.3	-	-	-	9.6	29.4	39.0	20.4	94.9	115.3
1968	10.4	59.3	69.7	-	-	-	9.7	36.0	45.7	20.1	95.3	115.4
1969	10.0	63.6	73.6	-	-	-	10.1	35.3	45.4	20.1	98.9	119.0
1970	12.0	40.7	52.7	-	-	-	13.8	36.5	50.3	25.8	77.2	103.0
1971	12.2	37.3	49.5	-	-	-	17.0	17.6	34.6	29.2	54.9	84.1
1972	10.8	70.6	81.4	-	-	-	16.6	14.7	31.3	27.4	85.3	112.7
1973	14.0	126.2	140.2	0.2	-0.6	-0.4	17.6	29.0	46.6	31.8	154.6	186.4
1974	17.0	85.2	102.2	0.2	-0.6	-0.4	26.8	40.5	67.3	44.0	125.1	169.1
1975	23.4	99.1	122.5	0.3	2.1	2.4	30.8	18.5	49.3	54.5	119.7	174.2
1976	27.9	121.0	148.9	9.5	-0.4	9.1	39.7	17.4	57.1	77.1	138.0	215.1
1977	32.8	240.9	273.7	18.0	29.4	47.4	50.4	17.3	67.7	101.2	287.6	388.8
1978	40.3	349.6	389.9	20.2	45.7	65.9	44.8	30.7	75.5	105.3	426.0	531.3
1979	50.2	296.0	346.2	34.1	105.2	139.3	38.2	60.6	98.8	122.5	461.8	584.3
1980	55.4	309.2	364.6	40.7	128.3	169.0	44.6	51.8	96.4	140.7	489.3	630.0
1981	62.0	124.3	186.3	47.1	141.3	188.4	54.0	25.7	79.7	163.1	291.3	454.4
1982	53.5	89.7	143.2	55.4	188.2	243.6	58.1	20.7	78.8	167.0	298.6	465.6
1983	58.7	116.2	174.9	62.7	127.8	190.5	67.7	40.2	107.9	189.1	284.2	473.3
1984	59.9	95.8	155.7	65.0	180.9	245.9	63.2	45.6	108.8	188.1	322.3	510.4
1985	67.8	262.7	330.5	76.0	379.6	455.6	68.9	53.1	122.0	212.7	695.4	908.1

W = Remuneration of employees; S = Gross operating surplus; and T = Total gross value added

TABLE A.18 - GROSS VALUE ADDED IN MINING AT CONSTANT 1975 PRICES - R millions

YEAR	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING
1950	35.4	-	8.1	43.5
1951	35.2	-	10.6	45.8
1952	37.7	-	12.8	50.5
1953	42.8	-	12.3	55.1
1954	47.9	-	12.2	60.1
1955	57.0	-	16.4	73.4
1956	69.3	-	19.0	88.3
1957	69.9	-	20.8	90.7
1958	63.4	-	17.6	81.0
1959	65.2	-	17.1	82.3
1960	65.5	-	17.3	82.8
1961	63.5	-	16.2	79.7
1962	72.0	-	23.1	95.1
1963	83.7	-	31.8	115.5
1964	108.0	-	35.1	143.1
1965	116.0	-	39.8	155.8
1966	123.3	-	47.0	170.3
1967	119.3	-	40.3	159.6
1968	120.8	-	38.2	159.0
1969	143.8	-	38.5	182.3
1970	131.0	-	44.4	175.4
1971	115.7	-	44.5	160.2
1972	111.9	-	43.2	155.1
1973	112.1	-	51.8	163.9
1974	110.1	0.1	58.0	168.2
1975	122.5	2.4	49.3	174.2
1976	118.7	7.9	43.3	169.9
1977	140.2	28.7	53.0	221.9
1978	133.0	33.1	53.6	219.7
1979	115.8	47.0	49.0	211.8
1980	109.3	49.4	43.6	202.3
1981	87.6	48.7	45.6	181.9
1982	71.3	46.2	51.6	169.1
1983	67.9	45.5	52.8	166.2
1984	65.4	45.3	48.3	159.0
1985	65.8	41.5	50.2	157.5

TABLE A.19 – GROSS VALUE ADDED (GVA) IN MINING USING DIFFERENT DEFLATING TECHNIQUES – R millions

YEAR	GVA AT CURRENT PRICES	GVA AT CONSTANT 1975 PRICES			
		1975 GVA extrapolated with volume indices	Double defla- tion method	Adjusted for domes- tic terms of trade	Deflated with CPI
1950	17.3	43.5	..	50.8	50.3
1951	29.6	45.8	..	82.4	79.8
1952	32.6	50.5	..	89.1	82.1
1953	33.0	55.1	..	84.6	78.6
1954	34.5	60.1	..	87.8	78.8
1955	49.3	73.4	..	131.5	106.9
1956	60.0	88.3	..	155.6	127.1
1957	51.0	90.7	..	124.3	104.3
1958	42.9	81.0	..	108.4	85.3
1959	47.8	82.3	..	112.5	93.2
1960	39.6	82.8	..	86.4	75.7
1961	43.8	79.7	..	106.9	82.6
1962	48.2	95.1	104.1	100.9	90.4
1963	57.8	115.5	128.0	132.5	108.0
1964	83.3	143.1	173.4	182.3	153.7
1965	95.7	155.8	182.2	198.5	169.7
1966	116.7	170.3	194.2	230.9	200.5
1967	115.3	159.6	200.3	217.1	192.2
1968	115.4	159.0	172.5	212.9	189.8
1969	119.0	182.3	201.9	212.6	188.9
1970	103.0	175.4	186.3	172.4	154.0
1971	84.1	160.2	158.4	135.0	119.0
1972	112.7	155.1	150.7	160.1	151.3
1973	186.4	163.9	191.0	219.1	231.8
1974	169.1	168.2	140.6	181.2	190.9
1975	174.2	174.2	174.2	174.2	174.2
1976	215.1	169.9	146.2	191.5	192.4
1977	388.8	221.9	148.5	314.7	309.1
1978	531.3	219.7	224.8	395.0	382.0
1979	584.3	211.8	164.7	391.0	370.7
1980	630.0	202.3	149.1	357.1	355.3
1981	454.4	181.9	148.9	217.6	223.3
1982	465.6	169.1	138.0	192.6	197.7
1983	473.3	166.2	159.3	175.2	179.8
1984	510.4	159.0	119.1	170.8	177.7
1985	908.1	157.5	144.5	274.8	282.4

TABLE A.20 - COMPOSITION OF GROSS VALUE ADDED IN MINING AT CURRENT PRICES BY TYPE OF MINING INDUSTRY - Percentages

YEAR	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING
1950	61.3	-	38.7	100.0
1951	54.4	-	45.6	100.0
1952	55.5	-	44.5	100.0
1953	54.8	-	45.2	100.0
1954	58.8	-	41.2	100.0
1955	49.1	-	50.9	100.0
1956	49.7	-	50.3	100.0
1957	54.9	-	45.1	100.0
1958	54.3	-	45.7	100.0
1959	51.9	-	48.1	100.0
1960	61.4	-	38.6	100.0
1961	66.2	-	33.8	100.0
1962	60.0	-	40.0	100.0
1963	66.8	-	33.2	100.0
1964	61.8	-	38.2	100.0
1965	62.9	-	37.1	100.0
1966	64.4	-	35.6	100.0
1967	66.2	-	33.8	100.0
1968	60.4	-	39.6	100.0
1969	61.8	-	38.2	100.0
1970	51.2	-	48.8	100.0
1971	58.9	-	41.1	100.0
1972	72.2	-	27.8	100.0
1973	75.2	-0.2	25.0	100.0
1974	60.4	-0.2	39.8	100.0
1975	70.3	1.4	28.3	100.0
1976	69.2	4.2	26.5	100.0
1977	70.4	12.2	17.4	100.0
1978	73.4	12.4	14.2	100.0
1979	59.3	23.8	16.9	100.0
1980	57.9	26.8	15.3	100.0
1981	41.0	41.5	17.5	100.0
1982	30.8	52.3	16.9	100.0
1983	37.0	40.2	22.8	100.0
1984	30.5	48.2	21.3	100.0
1985	36.4	50.2	13.4	100.0

TABLE A.21 - CONTRIBUTION OF MINING TO GROSS DOMESTIC PRODUCT AT CURRENT PRICES

YEAR	VALUE ADDED IN MINING				TOTAL GDP AT CURRENT PRICES	MINING'S CONTRIBUTION TO THE GDP			
	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING		DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING
	R millions					PERCENTAGE			
1950	10.6	-	6.7	17.3	55.2	19.2	-	12.1	31.3
1951	16.1	-	13.5	29.6	75.9	21.2	-	17.8	39.0
1952	18.1	-	14.5	32.6	84.3	21.5	-	17.2	38.7
1953	18.1	-	14.9	33.0	91.8	19.7	-	16.2	35.9
1954	20.3	-	14.2	34.5	99.6	20.4	-	14.3	34.6
1955	24.2	-	25.1	49.3	122.7	19.7	-	20.5	40.2
1956	29.8	-	30.2	60.0	134.0	22.2	-	22.5	44.8
1957	28.0	-	23.0	51.0	129.7	21.6	-	17.7	39.3
1958	23.3	-	19.6	42.9	120.4	19.4	-	16.3	35.6
1959	24.8	-	23.0	47.8	117.0	21.2	-	19.7	40.9
1960	24.3	-	15.3	39.6	110.4	22.0	-	13.9	35.9
1961	29.0	-	14.8	43.8	150.3	19.3	-	9.8	29.1
1962	28.9	-	19.3	48.2	159.8	18.1	-	12.1	30.2
1963	38.6	-	19.2	57.8	187.0	20.6	-	10.3	30.9
1964	51.5	-	31.8	83.3	218.6	23.6	-	14.5	38.1
1965	60.2	-	35.5	95.7	244.9	24.6	-	14.5	39.1
1966	75.2	-	41.5	116.7	272.8	27.6	-	15.2	42.8
1967	76.3	-	39.0	115.3	285.5	26.7	-	13.7	40.4
1968	69.7	-	45.7	115.4	319.2	21.8	-	14.3	36.2
1969	73.6	-	45.4	119.0	334.4	22.0	-	13.6	35.6
1970	52.7	-	50.3	103.0	336.7	15.7	-	14.9	30.6
1971	49.5	-	34.6	84.1	341.9	14.5	-	10.1	24.6
1972	81.4	-	31.3	112.7	410.9	19.8	-	7.6	27.4
1973	140.2	-0.4	46.6	186.4	534.2	26.2	-0.1	8.7	34.9
1974	102.2	-0.4	67.3	169.1	569.2	18.0	-0.1	11.8	29.7
1975	122.5	2.4	49.3	174.2	644.7	19.0	0.4	7.6	27.0
1976	148.9	9.1	57.1	215.1	758.1	19.6	1.2	7.5	28.4
1977	273.7	47.4	67.7	388.8	951.9	28.8	5.0	7.1	40.8
1978	389.9	65.9	75.5	531.3	1138.0	34.3	5.8	6.6	46.7
1979	346.2	139.3	98.8	584.3	1274.0	27.2	10.9	7.8	45.9
1980	364.6	169.0	96.4	630.0	1409.1	25.9	12.0	6.8	44.7
1981	186.3	188.4	79.7	454.4	1455.9	12.8	12.9	5.5	31.2
1982	143.2	243.7	78.8	465.7	1664.2	8.6	14.6	4.7	28.0
1983	174.9	190.5	107.9	473.3	1759.0	9.9	10.8	6.1	26.9
1984	155.7	245.9	108.8	510.4	1947.8	8.0	12.6	5.6	26.2
1985	330.5	455.6	122.0	908.1	2511.9	13.2	18.1	4.9	36.2

TABLE A.22 - CONTRIBUTION OF MINING TO THE GROSS DOMESTIC PRODUCT AT CONSTANT 1975 PRICES

YEAR	VALUE ADDED IN MINING				TOTAL GDP AT CONSTANT 1975 PRICES	MINING'S CONTRIBUTION TO THE GDP			
	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING		DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING
	R millions					PERCENTAGE			
1950	35.4	-	8.1	43.5	154.0	23.0	-	5.3	28.2
1951	35.2	-	10.6	45.8	174.9	20.1	-	6.1	26.2
1952	37.7	-	12.8	50.5	191.6	19.7	-	6.7	26.4
1953	42.8	-	12.3	55.1	205.9	20.8	-	6.0	26.8
1954	47.9	-	12.2	60.1	225.7	21.2	-	5.4	26.6
1955	57.0	-	16.4	73.4	269.1	21.2	-	6.1	27.3
1956	69.3	-	19.0	88.3	280.2	24.7	-	6.8	31.5
1957	69.9	-	20.8	90.7	292.5	23.9	-	7.1	31.0
1958	63.4	-	17.6	81.0	276.9	22.9	-	6.4	29.3
1959	65.2	-	17.1	82.3	245.3	26.6	-	7.0	33.6
1960	65.5	-	17.3	82.8	237.3	27.6	-	7.3	34.9
1961	63.5	-	16.2	79.7	339.2	18.7	-	4.8	23.5
1962	72.0	-	23.1	95.1	328.8	21.9	-	7.0	28.9
1963	83.7	-	31.8	115.5	411.7	20.3	-	7.7	28.1
1964	108.0	-	35.1	143.1	439.1	24.6	-	8.0	32.6
1965	116.0	-	39.8	155.8	465.2	24.9	-	8.6	33.5
1966	123.3	-	47.0	170.3	479.2	25.7	-	9.8	35.5
1967	119.3	-	40.3	159.6	480.0	24.9	-	8.4	33.3
1968	120.8	-	38.2	159.0	535.1	22.6	-	7.1	29.7
1969	143.8	-	38.5	182.3	567.0	25.4	-	6.8	32.2
1970	131.0	-	44.4	175.4	566.5	23.1	-	7.8	31.0
1971	115.7	-	44.5	160.2	574.0	20.2	-	7.8	27.9
1972	111.9	-	43.2	155.1	578.8	19.3	-	7.5	26.8
1973	112.1	-	51.8	163.9	572.8	19.6	-	9.0	28.6
1974	110.1	0.1	58.0	168.2	596.9	18.4	0.0	9.7	28.2
1975	122.5	2.4	49.3	174.2	644.7	19.0	0.4	7.6	27.0
1976	118.7	7.9	43.3	169.9	653.1	18.2	1.2	6.6	26.0
1977	140.2	28.7	53.0	221.9	677.7	20.7	4.2	7.8	32.7
1978	133.0	33.1	53.6	219.7	670.7	19.8	4.9	8.0	32.8
1979	115.8	47.0	49.0	211.8	672.9	17.2	7.0	7.3	31.5
1980	109.3	49.4	43.6	202.3	643.9	17.0	7.7	6.8	31.4
1981	87.6	48.7	45.6	181.9	661.3	13.2	7.4	6.9	27.5
1982	71.3	46.2	51.6	169.1	665.2	10.7	6.9	7.8	25.4
1983	67.9	45.5	52.8	166.2	642.0	10.6	7.1	8.2	25.9
1984	65.4	45.3	48.3	159.0	640.0	10.2	7.1	7.5	24.8
1985	65.8	41.5	50.2	157.5	642.8	10.2	6.5	7.8	24.5

TABLE A.23 - INPUTS IN THE MINING INDUSTRY - 1980 R ' 000

INDUSTRY	DIAMOND MINING	URANIUM MINING	OTHER MINING
1. Cattle farming	474	-	854
2. Sheep and goat farming	102	-	184
3. Other agriculture and forestry	804	833	618
4. Fishing	-	-	-
5. Diamond mining	-	-	-
6. Coal mining	-	-	2,924
7. Uranium mining	-	-	-
8. Other mining	-	2,043	4,905
9. Meat processing	-	-	-
10. Dairy products	-	-	-
11. Fish processing	-	-	-
12. Vegetable and animal oils and fats	3	14	-
13. Grain mill products	-	-	-
14. Bakery products	-	-	-
15. Other food products	-	-	-
16. Prepared animal feeds	9	33	18
17. Malt liquors and malt	-	-	-
18. Other beverages and tobacco	19	-	-
19. Textiles, excl. clothing	130	1,371	403
20. Clothing	103	736	225
21. Tanneries, leather products and footwear	72	119	62
22. Wood, wood products and furniture	168	283	161
23. Pulp, paper and paper products	44	-	81
24. Printing and publishing	-	-	-
25. Fertilisers and pesticides	12	-	28
26. Plastic materials and man-made fibres	150	798	313
27. Rubber products	1,598	1,950	2,160
28. Basic chemical products, petroleum and coal products	2,941	7,545	5,074
29. Paints, cleaning compounds and other chemical products	1,723	8,999	5,941
30. Non-metallic mineral products	134	670	392
31. Basic metal industries	365	3,886	962
32. Structural metal products	56	143	40
33. Other fabricated metal products, excl. machinery and equipment.	2,196	10,491	3,553
34. Agricultural machinery and equipment	-	-	-
35. Other machinery, excl. electrical	6,443	18,489	15,387
36. Electrical machinery, apparatus and supplies	829	4,003	1,445
37. Radio and TV equipment and electrical appliances and housewares	84	183	65
38. Motor vehicles	-	-	-
39. Motor vehicle parts and accessories	-	-	-
40. Other transport equipment	44	3,141	275
41. Other manufacturing industries	218	1,112	231
42. Electricity supply	7,515	10,038	12,150
43. Water supply	-	149	10
44. Building construction	-	-	132
45. Civil engineering and other construction	-	81	40
46. Wholesale and retail trade	4,851	7,597	8,442
47. Transport	1,090	4,221	3,290
48. Communication	758	1,020	907
49. Other services	12,433	25,326	15,258
Sale of goods and services by government	64	3,517	945
Total intermediate inputs	45,432	118,791	87,475
Remuneration of employees	55,354	40,727	44,572
Gross operating surplus	309,223	128,287	51,794
Net indirect taxes	48,916	2,275	1,496
TOTAL	458,925	290,080	185,337

TABLE A.24 - OUTPUTS OF THE MINING INDUSTRY - 1980 R ' 000

INDUSTRY	DIAMOND MINING	URANIUM MINING	OTHER MINING
1. Cattle farming	-	-	596
2. Sheep and goat farming	-	-	283
3. Other agriculture and forestry	-	-	-
4. Fishing	-	-	-
5. Diamond mining	-	-	-
6. Coal mining	-	-	-
7. Uranium mining	-	-	2,043
8. Other mining	-	-	4,905
9. Meat processing	-	-	-
10. Dairy products	-	-	-
11. Fish processing	-	-	70
12. Vegetable and animal oils and fats	-	-	-
13. Grain mill products	-	-	-
14. Bakery products	-	-	-
15. Other food products	-	-	-
16. Prepared animal feeds	-	-	-
17. Malt liquors and malt	-	-	-
18. Other beverages and tobacco	-	-	-
19. Textiles, excl. clothing	-	-	-
20. Clothing	-	-	-
21. Tanneries, leather products and footwear	-	-	70
22. Wood, wood products and furniture	-	-	-
23. Pulp, paper and paper products	-	-	-
24. Printing and publishing	-	-	-
25. Fertilisers and pesticides	-	-	-
26. Plastic materials and man-made fibres	-	-	-
27. Rubber products	-	-	-
28. Basic chemical products, petroleum and coal products	-	-	-
29. Paints, cleaning compounds and other chemical products	-	-	143
30. Non-metallic mineral products	-	-	817
31. Basic metal industries	-	-	-
32. Structural metal products	-	-	-
33. Other fabricated metal products, excl. machinery and equipment.	-	-	-
34. Agricultural machinery and equipment	-	-	-
35. Other machinery, excl. electrical	-	-	-
36. Electrical machinery, apparatus and supplies	-	-	-
37. Radio and TV equipment and electrical appliances and housewares	-	-	-
38. Motor vehicles	-	-	-
39. Motor vehicle parts and accessories	-	-	-
40. Other transport equipment	-	-	-
41. Other manufacturing industries	743	-	132
42. Electricity supply	-	-	-
43. Water supply	-	-	-
44. Building construction	-	-	1,470
45. Civil engineering and other construction	-	-	1,950
46. Wholesale and retail trade	-	-	-
47. Transport	-	-	-
48. Communication	-	-	-
49. Other services	-	-	-
Total intermediate outputs	743	-	12,479
Private consumption expenditure	-	-	170
Consumption expenditure by general government	-	-	-
Gross fixed investment	-	-	-
Change in inventories	12,213	7,081	(3,009)
Exports of goods and non-factor services	446,712	282,999	178,689
Sub-total	459,668	290,080	188,329
less: Imports of goods and non-factor services	743	-	2,992
TOTAL	458,925	290,080	185,337

TABLE A.25 - INPUT COEFFICIENTS OF THE MINING INDUSTRY; DIRECT REQUIREMENTS FROM OTHER INDUSTRIES PER RAND OF GROSS OUTPUT - 1980   R ' 000

INDUSTRY	DIAMOND MINING	URANIUM MINING	OTHER MINING
1. Cattle farming	0.00103	-	0.00461
2. Sheep and goat farming	0.00022	-	0.00099
3. Other agriculture and forestry	0.00175	0.00287	0.00333
4. Fishing	-	-	-
5. Diamond mining	-	-	-
6. Coal mining	-	-	0.01578
7. Uranium mining	-	-	-
8. Other mining	-	0.00704	0.02647
9. Meat processing	-	-	-
10. Dairy products	-	-	-
11. Fish processing	-	-	-
12. Vegetable and animal oils and fats	0.00001	0.00005	-
13. Grain mill products	-	-	-
14. Bakery products	-	-	-
15. Other food products	-	-	-
16. Prepared animal feeds	0.00002	0.00011	0.00010
17. Malt liquors and malt	-	-	-
18. Other beverages and tobacco	0.00004	-	-
19. Textiles, excl. clothing	0.00028	0.00473	0.00217
20. Clothing	0.00022	0.00254	0.00121
21. Tanneries, leather products and footwear	0.00016	0.00041	0.00033
22. Wood, wood products and furniture	0.00037	0.00098	0.00087
23. Pulp, paper and paper products	0.00010	-	0.00044
24. Printing and publishing	-	-	-
25. Fertilisers and pesticides	0.00003	-	0.00015
26. Plastic materials and man-made fibres	0.00033	0.00275	0.00169
27. Rubber products	0.00348	0.00672	0.01165
28. Basic chemical products, petroleum and coal products	0.00641	0.02601	0.02738
29. Paints, cleaning compounds and other chemical products	0.00375	0.03102	0.03206
30. Non-metallic mineral products	0.00029	0.00231	0.00212
31. Basic metal industries	0.00080	0.01340	0.00519
32. Structural metal products	0.00012	0.00049	0.00022
33. Other fabricated metal products, excl. machinery and equipment	0.00479	0.03617	0.01917
34. Agricultural machinery and equipment	-	-	-
35. Other machinery, excl. electrical	0.01404	0.06374	0.08302
36. Electrical machinery, apparatus and supplies	0.00181	0.01380	0.00780
37. Radio and TV equipment and electrical appliances and housewares	0.00018	0.00063	0.00035
38. Motor vehicles	-	-	-
39. Motor vehicle parts and accessories	-	-	-
40. Other transport equipment	0.00010	0.01083	0.00148
41. Other manufacturing industries	0.00048	0.00383	0.00125
42. Electricity supply	0.01638	0.03460	0.06556
43. Water supply	-	0.00051	0.00005
44. Building construction	-	-	0.00071
45. Civil engineering and other construction	-	0.00028	0.00022
46. Wholesale and retail trade	0.01057	0.02619	0.04555
47. Transport	0.00238	0.01455	0.01775
48. Communication	0.00165	0.00352	0.00489
49. Other services	0.02709	0.08731	0.08233
Sale of goods and services by government	0.00014	0.01212	0.00510
Total intermediate inputs	0.09900	0.40951	0.47198
Remuneration of employees	0.12062	0.14040	0.24049
Gross operating surplus	0.67380	0.44225	0.27946
Net indirect taxes	0.10659	0.00784	0.00807
TOTAL	1.00000	1.00000	1.00000

TABLE A.26 - INVERSE INPUT COEFFICIENTS OF THE MINING INDUSTRY; TOTAL REQUIREMENTS FROM OTHER INDUSTRIES (DIRECT AND INDIRECT) PER RAND DELIVERY TO FINAL DEMAND FOR MINING PRODUCTS - 19

INDUSTRY	DIAMOND MINING	URANIUM MINING	OTHER MINING
1. Cattle farming	0.00144	0.00123	0.00636
2. Sheep and goat farming	0.00130	0.00615	0.00605
3. Other agriculture and forestry	0.00254	0.00544	0.00674
4. Fishing	0.00004	0.00010	0.00013
5. Diamond mining	1.00063	0.00343	0.00211
6. Coal mining	0.00521	0.01290	0.03789
7. Uranium mining	0.00000	1.00000	0.00000
8. Other mining	0.00033	0.00909	1.02887
9. Meat processing	0.00044	0.00142	0.00163
10. Dairy products	0.00021	0.00072	0.00092
11. Fish processing	0.00010	0.00028	0.00038
12. Vegetable and animal oils and fats	0.00015	0.00094	0.00094
13. Grain mill products	0.00015	0.00064	0.00076
14. Bakery products	0.00003	0.00009	0.00011
15. Other food products	0.00021	0.00070	0.00089
16. Prepared animal feeds	0.00025	0.00068	0.00096
17. Malt liquors and malt	0.00018	0.00057	0.00081
18. Other beverages and tobacco	0.00016	0.00037	0.00053
19. Textiles, excl. clothing	0.00265	0.01539	0.01243
20. Clothing	0.00040	0.00328	0.00198
21. Tanneries, leather products and footwear	0.00019	0.00056	0.00048
22. Wood, wood products and furniture	0.00108	0.00386	0.00391
23. Pulp, paper and paper products	0.00240	0.00902	0.01054
24. Printing and publishing	0.00185	0.00691	0.00779
25. Fertilisers and pesticides	0.00072	0.00219	0.00267
26. Plastic materials and man-made fibres	0.00353	0.01653	0.01675
27. Rubber products	0.00465	0.01170	0.01673
28. Basic chemical products, petroleum and coal products	0.01272	0.05654	0.06159
29. Paints, cleaning compounds and other chemical products	0.00559	0.04025	0.04264
30. Non-metallic mineral products	0.00123	0.00715	0.00718
31. Basic metal industries	0.00802	0.05307	0.04256
32. Structural metal products	0.00027	0.00123	0.00094
33. Other fabricated metal products, excl. machinery and equipment	0.00653	0.04521	0.02853
34. Agricultural machinery and equipment	0.00004	0.00013	0.00017
35. Other machinery, excl. electrical	0.01620	0.07403	0.09710
36. Electrical machinery, apparatus and supplies	0.00377	0.02215	0.01840
37. Radio and TV equipment and electrical appliances and housewares	0.00390	0.00131	0.00119
38. Motor vehicles	0.00000	0.00000	0.00000
39. Motor vehicle parts and accessories	0.00096	0.00351	0.00411
40. Other transport equipment	0.00067	0.01426	0.00468
41. Other manufacturing industries	0.00121	0.00665	0.00410
42. Electricity supply	0.02319	0.05689	0.09657
43. Water supply	0.00061	0.00274	0.00241
44. Building construction	0.00055	0.00192	0.00306
45. Civil engineering and other construction	0.00045	0.00170	0.00214
46. Wholesale and retail trade	0.01871	0.05761	0.08301
47. Transport	0.00920	0.04000	0.04921
48. Communication	0.00358	0.01056	0.01283
49. Other services	0.04120	0.15625	0.15122

TABLE A.27 – VALUE ADDED DIRECTLY AND INDIRECTLY RESULTING FROM MINERAL PRODUCTION – R MILLIONS

	DIAMOND MINING			URANIUM MINING			OTHER MINING			TOTAL MINING			TOTAL
YEAR	DIRECT	INDIRECT	TOTAL	DIRECT	INDIRECT	TOTAL	DIRECT	INDIRECT	TOTAL	DIRECT	INDIRECT	TOTAL	GDP*
1970	59.6	7.1	66.7	0.0	0.0	0.0	50.8	4.1	54.9	110.4	11.2	121.6	359.5
1971	57.2	3.6	60.8	0.0	0.0	0.0	35.2	7.7	42.9	92.4	11.3	103.7	368.7
1972	90.9	3.4	94.3	0.0	0.0	0.0	31.9	11.7	43.6	122.8	15.1	137.9	439.9
1973	155.1	1.2	156.3	-0.4	0.2	-0.2	47.3	15.2	62.5	202.0	16.6	218.6	573.3
1974	116.1	13.3	129.4	-0.4	0.2	-0.2	68.1	17.6	85.7	183.8	31.1	214.9	609.7
1975	135.2	9.0	144.2	2.4	0.2	2.6	50.2	20.9	71.1	187.8	30.1	217.9	690.4
1976	170.8	15.3	186.1	9.4	9.1	18.5	58.0	23.8	81.8	238.2	48.2	286.4	825.4
1977	293.9	38.5	332.4	48.0	28.6	76.6	68.6	22.3	90.9	410.5	89.3	499.8	1028.4
1978	439.2	10.2	449.4	66.9	27.4	94.3	76.2	20.5	96.7	582.3	58.1	640.4	1240.0
1979	393.3	20.6	413.9	140.8	37.9	178.7	99.4	35.0	134.4	633.5	93.4	726.9	1390.9
1980	414.4	20.7	435.1	170.8	48.3	219.1	96.7	39.3	136.0	681.9	108.3	790.2	1526.5
1981	210.6	18.9	229.5	190.4	47.3	237.7	80.6	35.6	116.2	481.6	101.7	583.3	1559.5
1982	165.6	21.2	186.8	246.2	51.0	297.2	79.3	40.2	119.5	491.1	112.4	603.5	1778.8
1983	201.2	11.6	212.8	193.0	45.4	238.4	109.3	41.8	151.1	503.5	98.8	602.3	1859.0
1984	178.9	25.4	204.3	247.4	79.9	327.3	110.5	46.2	156.7	536.8	151.5	688.3	2090.5
1985	372.2	13.0	385.2	457.1	77.2	534.3	125.0	66.7	191.7	954.3	156.9	1111.2	2732.0
	VALUE ADDED IN MINING AS PERCENTAGE OF GROSS DOMESTIC PRODUCT*												
1970	16.6	2.0	18.6	0.0	0.0	0.0	14.1	1.1	15.3	30.7	3.1	33.8	100.0
1971	15.5	1.0	16.5	0.0	0.0	0.0	9.5	2.1	11.6	25.1	3.1	28.1	100.0
1972	20.7	0.8	21.4	0.0	0.0	0.0	7.3	2.7	9.9	27.9	3.4	31.3	100.0
1973	27.1	0.2	27.3	-0.1	.0	.0	8.3	2.7	10.9	35.2	2.9	38.1	100.0
1974	19.0	2.2	21.2	-0.1	.0	.0	11.2	2.9	14.1	30.1	5.1	35.2	100.0
1975	19.6	1.3	20.9	0.3	.0	0.4	7.3	3.0	10.3	27.2	4.4	31.6	100.0
1976	20.7	1.9	22.5	1.1	1.1	2.2	7.0	2.9	9.9	28.9	5.8	34.7	100.0
1977	28.6	3.7	32.3	4.7	2.8	7.4	6.7	2.2	8.8	39.9	8.7	48.6	100.0
1978	35.4	0.8	36.2	5.4	2.2	7.6	6.1	1.7	7.8	47.0	4.7	51.6	100.0
1979	28.3	1.5	29.8	10.1	2.7	12.8	7.1	2.5	9.7	45.5	6.7	52.3	100.0
1980	27.1	1.4	28.5	11.2	3.2	14.4	6.3	2.6	8.9	44.7	7.1	51.8	100.0
1981	13.5	1.2	14.7	12.2	3.0	15.2	5.2	2.3	7.4	30.9	6.5	37.4	100.0
1982	9.3	1.2	10.5	13.8	2.9	16.7	4.5	2.3	6.7	27.6	6.3	33.9	100.0
1983	10.8	0.6	11.4	10.4	2.4	12.8	5.9	2.2	8.1	27.1	5.3	32.4	100.0
1984	8.6	1.2	9.8	11.8	3.8	15.7	5.3	2.2	7.5	25.7	7.2	32.9	100.0
1985	13.6	0.5	14.1	16.7	2.8	19.6	4.6	2.4	7.0	34.9	5.7	40.7	100.0

* AT MARKET PRICES

TABLE A.28 - FIXED CAPITAL STOCK IN MINING AT CONSTANT 1975 PRICES

YEAR	R MILLIONS				CAPITAL STOCK IN MINING AS PERCENTAGE OF:	
	BUILDINGS AND OTHER CONSTRUC-TION WORKS	TRANSPORT EQUIPMENT, MACHINERY AND OTHER EQUIPMENT	TOTAL CAPITAL STOCK IN MINING	TOTAL CAPITAL STOCK	TOTAL CAPITAL STOCK	TOTAL CAPITAL STOCK EXCL. GENERAL GOVERNMENT
1950	22.7	9.8	32.5	278.3	11.7	14.9
1951	26.1	11.4	37.5	309.6	12.1	15.3
1952	33.6	14.9	48.5	348.5	13.9	17.5
1953	41.5	18.4	59.9	392.7	15.3	19.0
1954	47.2	20.7	67.9	434.9	15.6	19.5
1955	48.4	20.5	68.9	474.0	14.5	18.2
1956	49.4	20.2	69.6	511.7	13.6	17.1
1957	48.8	21.8	70.6	558.4	12.6	15.9
1958	48.6	24.8	73.4	617.3	11.9	15.0
1959	48.3	24.6	72.9	674.1	10.8	13.8
1960	49.5	24.5	74.0	734.9	10.1	13.1
1961	57.6	27.8	85.4	808.2	10.6	14.0
1962	71.8	32.1	103.9	889.0	11.7	15.7
1963	77.5	36.1	113.6	961.0	11.8	16.1
1964	79.0	39.7	118.7	1032.3	11.5	15.9
1965	81.1	43.3	124.4	1103.2	11.3	15.9
1966	83.1	45.6	128.7	1182.9	10.9	15.8
1967	84.4	46.9	131.3	1286.7	10.2	15.4
1968	87.6	50.3	137.9	1397.4	9.9	15.3
1969	90.6	52.9	143.5	1517.6	9.5	15.2
1970	100.4	54.0	154.4	1632.0	9.5	15.5
1971	101.0	52.0	153.0	1790.6	8.5	14.4
1972	104.3	52.8	157.1	1932.7	8.1	13.9
1973	104.7	64.2	168.9	2061.1	8.2	14.3
1974	129.5	94.4	223.9	2228.9	10.0	17.5
1975	199.9	123.7	323.6	2474.1	13.1	22.6
1976	228.3	155.4	383.7	2667.3	14.4	24.9
1977	237.4	180.0	417.4	2809.6	14.9	26.1
1978	256.1	195.3	451.4	2925.4	15.4	27.6
1979	253.4	199.5	452.9	3032.4	14.9	27.6
1980	261.5	219.4	480.9	3157.8	15.2	28.8
1981	262.2	219.9	482.1	3249.6	14.8	28.6
1982	252.6	210.3	462.9	3298.1	14.0	27.7
1983	245.6	196.8	442.4	3310.4	13.4	27.0
1984	237.5	180.1	417.6	3309.2	12.6	26.1
1985	227.0	163.6	390.6	3310.6	11.8	25.1

TABLE A.29 - GROSS FIXED INVESTMENT IN MINING AT CURRENT PRICES BY TYPE OF INDUSTRY

YEAR	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING
	R MILLIONS			
1970	5.7	-	6.6	12.3
1971	1.8	-	4.2	6.0
1972	6.3	-	4.3	10.6
1973	8.7	4.8	4.8	18.3
1974	27.3	18.1	14.2	59.6
1975	19.0	73.5	28.7	121.2
1976	29.5	54.7	16.0	100.2
1977	30.3	35.9	12.6	78.8
1978	36.7	41.2	12.3	90.2
1979	20.4	23.3	8.8	52.5
1980	48.7	14.4	49.3	112.4
1981	28.9	24.4	21.3	74.6
1982	12.0	24.6	11.0	47.6
1983	6.3	19.5	15.0	40.8
1984	7.0	19.7	5.2	31.9
1985	9.7	10.5	11.7	31.9
	PERCENTAGE			
1970	46.3	-	53.7	100.0
1971	30.0	-	70.0	100.0
1972	59.4	-	40.6	100.0
1973	47.5	26.2	26.2	100.0
1974	45.8	30.4	23.8	100.0
1975	15.7	60.6	23.7	100.0
1976	29.4	54.6	16.0	100.0
1977	38.5	45.6	16.0	100.0
1978	40.7	45.7	13.6	100.0
1979	38.9	44.4	16.8	100.0
1980	43.3	12.8	43.9	100.0
1981	38.7	32.7	28.6	100.0
1982	25.2	51.7	23.1	100.0
1983	15.4	47.8	36.8	100.0
1984	21.9	61.8	16.3	100.0
1985	30.4	32.9	36.7	100.0

TABLE A.30 - FIXED INVESTMENT IN MINING AT CONSTANT 1975 PRICES
R millions

YEAR	BUILD-INGS	CONSTRUC-TION WORKS	TRANSPORT EQUIP-MENT	MACHINERY AND OTHER EQUIP-MENT	TOTAL FIXED INVEST-MENT
1950	6.2		2.9		9.1
1951	4.7		2.5		7.2
1952	9.1		4.6		13.7
1953	9.8		4.9		14.7
1954	7.8		4.0		11.8
1955	3.3		1.6		4.9
1956	3.2		1.6		4.8
1957	1.6		3.7		5.3
1958	2.1		5.4		7.5
1959	2.0		2.4		4.4
1960	3.6		2.6		6.2
1961	10.9		6.4		17.3
1962	17.5		7.9		25.4
1963	9.4		8.0		17.4
1964	5.3		7.9		13.2
1965	6.1		8.3		14.4
1966	6.2		7.2		13.4
1967	5.7		6.5		12.2
1968	7.8		8.9		16.7
1969	7.8		8.3		16.1
1970	3.6	11.5	0.2	6.7	22.0
1971	1.5	4.6	0.1	3.8	10.0
1972	2.0	7.1	0.3	6.8	16.2
1973	3.9	2.5	0.5	18.2	25.1
1974	25.6	6.3	7.7	32.0	71.6
1975	70.2	9.9	4.1	37.0	121.2
1976	29.7	9.8	9.2	37.1	85.8
1977	17.2	3.5	4.9	36.4	62.0
1978	23.8	7.2	7.3	25.7	64.0
1979	7.2	2.8	4.5	18.5	33.0
1980	16.6	4.7	4.4	35.5	61.2
1981	10.5	3.5	5.0	17.4	36.4
1982	4.8	2.3	2.0	11.0	20.1
1983	1.8	4.1	1.3	7.9	15.1
1984	1.3	3.6	1.2	4.6	10.7
1985	0.5	2.1	1.4	4.7	8.7

TABLE A.31 – FIXED INVESTMENT IN MINING AT CURRENT PRICES – R millions

YEAR	BUILDINGS	CONSTRUCTION WORKS	TRANSPORT EQUIPMENT	MACHINERY AND OTHER EQUIPMENT	TOTAL FIXED INVESTMENT	AS % OF TOTAL FIXED INVESTMENT	AS % OF PRIVATE FIXED INVESTMENT
1950	1.8		1.0		2.8	20.7	25.7
1951	1.6		1.0		2.6	16.4	19.8
1952	3.4		2.0		5.4	24.9	30.3
1953	3.6		2.1		5.7	23.1	29.5
1954	2.8		1.7		4.5	19.0	24.5
1955	1.2		0.7		1.9	8.1	10.7
1956	1.2		0.7		1.9	7.7	10.7
1957	0.6		1.7		2.3	7.6	11.3
1958	0.8		2.5		3.3	9.0	13.9
1959	0.8		1.1		1.9	5.1	9.8
1960	1.4		1.2		2.6	6.3	14.4
1961	4.3		3.0		7.3	15.1	33.5
1962	7.1		3.8		10.9	20.6	41.0
1963	3.9		3.9		7.8	14.9	30.7
1964	2.3		3.9		6.2	11.3	24.5
1965	2.8		4.2		7.0	12.0	25.4
1966	3.0		3.8		6.8	10.2	23.9
1967	2.9		3.5		6.4	8.0	19.6
1968	4.1		4.8		8.9	10.3	23.9
1969	4.1		4.6		8.7	9.0	23.1
1970	2.0	6.4	0.1	3.8	12.3	12.5	28.7
1971	0.9	2.7	0.1	2.3	6.0	4.5	16.4
1972	1.3	4.5	0.2	4.6	10.6	7.8	25.1
1973	2.8	1.8	0.4	13.3	18.3	12.5	35.2
1974	21.2	5.3	6.4	26.7	59.6	29.1	58.8
1975	70.2	9.9	4.1	37.0	121.2	36.5	71.1
1976	34.4	11.4	10.7	43.7	100.2	30.0	71.7
1977	21.7	4.5	6.3	46.3	78.8	25.7	67.5
1978	33.4	10.3	10.3	36.2	90.2	29.6	69.5
1979	11.5	4.6	7.1	29.3	52.5	15.4	51.1
1980	31.1	9.2	7.7	64.4	112.4	25.8	64.1
1981	22.7	8.0	10.0	33.9	74.6	17.3	51.9
1982	12.3	6.0	4.8	24.5	47.6	11.5	42.2
1983	5.4	12.4	3.6	19.4	40.8	11.6	38.2
1984	4.3	12.0	3.5	12.1	31.9	10.3	29.1
1985	1.8	7.9	7.0	15.2	31.9	9.5	33.6

TABLE A.32 - CAPITAL/OUTPUT RATIO IN MINING

YEAR	REAL FIXED CAPITAL STOCK IN MINING	REAL GROSS VALUE ADDED IN MINING	CAPITAL/ OUTPUT RATIO *	INDEX OF CAPITAL/ OUTPUT RATIO
	R MILLIONS			1975=100
1950	32.5	43.5	0.75	40.2
1951	37.5	45.8	0.82	44.1
1952	48.5	50.5	0.96	51.7
1953	59.9	55.1	1.09	58.5
1954	67.9	60.1	1.13	60.8
1955	68.9	73.4	0.94	50.5
1956	69.6	88.3	0.79	42.4
1957	70.6	90.7	0.78	41.9
1958	73.4	81.0	0.91	48.8
1959	72.9	82.3	0.89	47.7
1960	74.0	82.8	0.89	48.1
1961	85.4	79.7	1.07	57.7
1962	103.9	95.1	1.09	58.8
1963	113.6	115.5	0.98	52.9
1964	118.7	143.1	0.83	44.7
1965	124.4	155.8	0.80	43.0
1966	128.7	170.3	0.76	40.7
1967	131.3	159.6	0.82	44.3
1968	137.9	159.0	0.87	46.7
1969	143.5	182.3	0.79	42.4
1970	154.4	175.4	0.88	47.4
1971	153.0	160.2	0.96	51.4
1972	157.1	155.1	1.01	54.5
1973	168.9	163.9	1.03	55.5
1974	223.9	168.2	1.33	71.7
1975	323.6	174.2	1.86	100.0
1976	383.7	169.9	2.26	121.6
1977	417.4	221.9	1.88	101.3
1978	451.4	219.7	2.05	110.6
1979	452.9	211.7	2.14	115.2
1980	480.9	202.3	2.38	128.0
1981	482.1	181.9	2.65	142.7
1982	462.9	169.2	2.74	147.3
1983	442.4	166.2	2.66	143.3
1984	417.6	159.0	2.63	141.4
1985	390.6	157.5	2.48	133.5

* REAL FIXED CAPITAL STOCK DIVIDED BY REAL GROSS VALUE ADDED.

TABLE A.33 - INDICES OF FACTOR INPUTS IN MINING

YEAR	REAL CAPITAL STOCK		EMPLOYMENT		CAPITAL/LABOUR	
	R mill.	Index: 1975=100	Numbers	Index: 1975=100	Ratio*	Index: 1975=100
1950	32.5	10.0	7,654	41.6	0.242	24.2
1951	37.5	11.6	9,272	50.3	0.230	23.0
1952	48.5	15.0	10,962	59.5	0.252	25.2
1953	59.9	18.5	11,410	62.0	0.299	29.9
1954	67.9	21.0	11,666	63.3	0.331	33.1
1955	68.9	21.3	13,505	73.3	0.290	29.0
1956	69.6	21.5	13,669	74.2	0.290	29.0
1957	70.6	21.8	13,894	75.4	0.289	28.9
1958	73.4	22.7	12,572	68.3	0.332	33.2
1959	72.9	22.5	11,693	63.5	0.355	35.5
1960	74.0	22.9	11,771	63.9	0.358	35.8
1961	85.4	26.4	11,329	61.5	0.429	42.9
1962	103.9	32.1	10,737	58.3	0.551	55.1
1963	113.6	35.1	10,649	57.8	0.607	60.7
1964	118.7	36.7	12,862	69.8	0.525	52.5
1965	124.4	38.4	13,638	74.1	0.519	51.9
1966	128.7	39.8	14,785	80.3	0.495	49.5
1967	131.3	40.6	15,381	83.5	0.486	48.6
1968	137.9	42.6	15,480	84.1	0.507	50.7
1969	143.5	44.3	16,916	91.8	0.483	48.3
1970	154.4	47.7	18,258	99.1	0.481	48.1
1971	153.0	47.3	17,530	95.2	0.497	49.7
1972	157.1	48.5	15,980	86.8	0.560	56.0
1973	168.9	52.2	16,984	92.2	0.566	56.6
1974	223.9	69.2	18,512	100.5	0.688	68.8
1975	323.6	100.0	18,417	100.0	1.000	100.0
1976	383.7	118.6	19,897	108.0	1.098	109.8
1977	417.4	129.0	21,230	115.3	1.119	111.9
1978	451.4	139.5	19,269	104.6	1.333	133.3
1979	452.9	140.0	20,074	109.0	1.284	128.4
1980	480.9	148.6	20,183	109.6	1.356	135.6
1981	482.1	149.0	20,002	108.6	1.372	137.2
1982	462.9	143.0	17,300	93.9	1.523	152.3
1983	442.4	136.7	16,595	90.1	1.517	151.7
1984	417.6	129.0	15,624	84.8	1.521	152.1
1985	390.6	120.7	14,869	80.7	1.495	149.5

* INDEX OF CAPITAL STOCK DIVIDED BY INDEX OF EMPLOYMENT.

TABLE A.34 - ECONOMIC CLASSIFICATION OF THE ECONOMICALLY ACTIVE POPULATION OF SWA/NAMIBIA

INDUSTRIAL DIVISION	1951			1960			1970		
	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL
AGRICULTURE	6,215	99,371	105,586	6,127	111,170	117,297	5,405	119,294	124,699
FISHING	300	1,000	1,300	381	1,316	1,697	253	1,216	1,469
MINING AND QUARRYING ..	1,193	7,973	9,166	1,696	10,211	11,907	3,283	14,975	18,258
MANUFACTURING	1,401	4,036	5,437	1,803	4,934	6,737	1,830	7,906	9,736
ELECTRICITY AND WATER .	61	63	124	175	734	909	207	663	870
CONSTRUCTION	1,473	4,280	5,753	2,756	9,613	12,369	897	9,070	9,967
COMMERCE	2,850	2,017	4,867	5,899	4,738	10,637	7,114	10,140	17,254
TRANSPORT AND COMMUNICATION	1,957	3,211	5,168	2,932	3,614	6,546	3,865	6,329	10,194
OTHER SERVICES	3,035	16,931	19,966	5,049	19,288	24,337	8,891	32,006	40,897
UNEMPLOYED AND NON-CLASSIFIABLE	316	3,989	4,305	501	10,334	10,835	1,845	17,686	19,531
TOTAL: ECONOMICALLY ACTIVE ...	18,801	142,871	161,672	27,319	175,952	203,271	33,590	219,285	252,875
NOT ECONOMICALLY ACTIVE	31,129	114,791	245,920	46,145	276,588	322,733	48,966	437,791	486,757
TOTAL POPULATION	49,930	257,662	407,592	73,464	452,540	526,004	82,556	657,076	739,632

INDUSTRIAL DIVISION	1977			1981			1985		
	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL	WHITE	BLACK	TOTAL
AGRICULTURE	4,999	138,948	143,947	4,946	144,399	149,345	4,870	144,500	149,370
FISHING	385	1,162	1,547	450	1,358	1,808	420	1,320	1,740
MINING AND QUARRYING ..	4,159	17,071	21,230	4,273	15,729	20,002	4,120	10,750	14,870
MANUFACTURING	1,538	8,769	10,307	1,572	8,963	10,535	1,630	9,250	10,880
ELECTRICITY AND WATER .	384	1,229	1,613	473	1,514	1,987	480	1,560	2,040
CONSTRUCTION	989	9,409	10,398	861	8,191	9,052	810	7,850	8,660
COMMERCE	6,465	12,109	18,574	6,411	13,113	19,524	6,460	14,050	20,510
TRANSPORT AND COMMUNICATION	3,192	7,459	10,651	3,661	8,069	11,730	3,500	7,800	11,300
OTHER SERVICES	9,047	50,172	59,219	9,447	62,537	71,984	10,570	68,450	79,020
UNEMPLOYED AND NON-CLASSIFIABLE	548	32,273	32,821	456	48,241	48,697	390	85,940	86,330
TOTALS: ECONOMICALLY ACTIVE ...	31,706	278,601	310,307	32,550	312,114	344,664	33,250	351,470	384,720
NOT ECONOMICALLY ACTIVE	46,580	555,535	602,115	43,396	643,867	687,263	43,900	740,730	784,630
TOTAL POPULATION	78,286	834,136	912,422	75,946	955,981	1,031,927	77,150	1,092,200	1,169,350

TABLE A.35 - EMPLOYMENT IN MINING

YEAR	DIAMOND MINING			NON-DIAMOND MINING			TOTAL MINING		
	WHITES	BLACKS	TOTAL	WHITES	BLACKS	TOTAL	WHITES	BLACKS	TOTAL
1950	375	2,714	3,089	804	3,761	4,565	1,179	6,475	7,654
1951	396	3,056	3,452	921	4,899	5,820	1,317	7,955	9,272
1952	482	3,406	3,888	1,043	6,031	7,074	1,525	9,437	10,962
1953	554	3,845	4,399	1,161	5,850	7,011	1,715	9,695	11,410
1954	646	4,768	5,414	1,145	5,107	6,252	1,791	9,875	11,666
1955	757	5,171	5,928	1,131	6,446	7,577	1,888	11,617	13,505
1956	832	5,379	6,211	1,200	6,258	7,458	2,032	11,637	13,669
1957	906	5,190	6,096	1,142	6,656	7,798	2,048	11,846	13,894
1958	931	5,099	6,030	912	5,630	6,542	1,843	10,729	12,572
1959	991	5,111	6,102	748	4,843	5,591	1,739	9,954	11,693
1960	1,014	4,572	5,586	826	5,359	6,185	1,840	9,931	11,771
1961	1,033	4,206	5,239	856	5,234	6,090	1,889	9,440	11,329
1962	1,058	3,833	4,891	945	4,901	5,846	2,003	8,734	10,737
1963	1,059	3,813	4,872	1,084	4,693	5,777	2,143	8,506	10,649
1964	1,303	4,119	5,422	1,351	6,089	7,440	2,654	10,208	12,862
1965	1,348	4,327	5,675	1,416	6,547	7,963	2,764	10,874	13,638
1966	1,371	4,751	6,122	1,532	7,131	8,663	2,903	11,882	14,785
1967	1,361	4,983	6,344	1,574	7,463	9,037	2,935	12,446	15,381
1968	1,350	4,898	6,248	1,584	7,648	9,232	2,934	12,546	15,480
1969	1,340	5,257	6,597	1,818	8,501	10,319	3,158	13,758	16,916
1970	1,330	5,269	6,599	1,953	9,706	11,659	3,283	14,975	18,258
1971	1,320	4,447	5,767	1,801	9,962	11,763	3,121	14,409	17,530
1972	1,310	3,644	4,954	1,710	9,316	11,026	3,020	12,960	15,980
1973	1,300	4,093	5,393	1,813	9,778	11,591	3,113	13,871	16,984
1974	1,290	4,689	5,979	2,003	10,530	12,533	3,293	15,219	18,512
1975	1,281	4,766	6,047	2,185	10,185	12,370	3,466	14,951	18,417
1976	1,271	4,728	5,999	2,456	11,442	13,898	3,727	16,170	19,897
1977	1,262	5,291	6,553	2,897	11,780	14,677	4,159	17,071	21,230
1978	1,252	5,509	6,761	2,692	9,816	12,508	3,944	15,325	19,269
1979	1,343	5,900	7,243	2,802	10,029	12,831	4,145	15,929	20,074
1980	1,516	5,537	7,053	2,822	10,308	13,130	4,338	15,845	20,183
1981	..	..	6,503	..	..	13,499	..	..	20,002
1982	..	..	5,346	..	..	11,954	..	..	17,300
1983	..	..	5,179	..	..	11,416	..	..	16,595
1984	..	..	5,068	..	..	10,556	..	..	15,624
1985	..	..	4,955	..	..	9,914	..	..	14,869

TABLE A.36 - INDICES OF EMPLOYMENT IN MINING

YEAR	TOTAL MINING			DIAMOND MINING	NON-DIAMOND MINING
	WHITES	BLACKS	TOTAL		
1950	34.0	43.3	41.6	51.1	36.9
1951	38.0	53.2	50.3	57.1	47.0
1952	44.0	63.1	59.5	64.3	57.2
1953	49.5	64.8	62.0	72.7	56.7
1954	51.7	66.0	63.3	89.5	50.5
1955	54.5	77.7	73.3	98.0	61.3
1956	58.6	77.8	74.2	102.7	60.3
1957	59.1	79.2	75.4	100.8	63.0
1958	53.2	71.8	68.3	99.7	52.9
1959	50.2	66.6	63.5	100.9	45.2
1960	53.1	66.4	63.9	92.4	50.0
1961	54.5	63.1	61.5	86.6	49.2
1962	57.8	58.4	58.3	80.9	47.3
1963	61.8	56.9	57.8	80.6	46.7
1964	76.6	68.3	69.8	89.7	60.1
1965	79.7	72.7	74.1	93.8	64.4
1966	83.8	79.5	80.3	101.2	70.0
1967	84.7	83.2	83.5	104.9	73.1
1968	84.7	83.9	84.1	103.3	74.6
1969	91.1	92.0	91.8	109.1	83.4
1970	94.7	100.2	99.1	109.1	94.3
1971	90.0	96.4	95.2	95.4	95.1
1972	87.1	86.7	86.8	81.9	89.1
1973	89.8	92.8	92.2	89.2	93.7
1974	95.0	101.8	100.5	98.9	101.3
1975	100.0	100.0	100.0	100.0	100.0
1976	107.5	108.2	108.0	99.2	112.4
1977	120.0	114.2	115.3	108.4	118.6
1978	113.8	102.5	104.6	111.8	101.1
1979	119.6	106.5	109.0	119.8	103.7
1980	125.2	106.0	109.6	116.6	106.1
1981	..	..	108.6	107.5	109.1
1982	..	..	93.9	88.4	96.6
1983	..	..	90.1	85.6	92.3
1984	..	..	84.8	83.8	85.3
1985	..	..	80.7	81.9	80.1

TABLE A.37 - SALARIES AND WAGES AND AVERAGE EARNINGS IN MINING

YEAR	SALARIES AND WAGES			AVERAGE EARNINGS					
	WHITES	BLACKS	TOTAL	WHITES	BLACKS	TOTAL	WHITES	BLACKS	TOTAL
	R ' 000			RAND			INDEX: 1975 = 100		
1950	1,686	487	2,173	1,430	75	284	19.9	6.8	12.6
1951	2,041	666	2,707	1,550	84	292	21.6	7.5	13.0
1952	2,545	796	3,341	1,669	84	305	23.3	7.6	13.5
1953	3,048	1,042	4,090	1,777	107	358	24.8	9.7	15.9
1954	3,184	1,144	4,328	1,778	116	371	24.8	10.4	16.5
1955	3,330	1,552	4,882	1,764	134	361	24.6	12.0	16.0
1956	4,036	1,570	5,606	1,986	135	410	27.7	12.1	18.2
1957	4,362	1,576	5,938	2,130	133	427	29.7	12.0	19.0
1958	4,202	1,446	5,648	2,280	135	449	31.8	12.1	19.9
1959	4,174	1,396	5,570	2,400	140	476	33.5	12.6	21.1
1960	4,475	1,619	6,094	2,432	163	518	33.9	14.6	23.0
1961	4,694	1,728	6,422	2,485	183	567	34.7	16.4	25.2
1962	4,912	1,772	6,684	2,452	203	623	34.2	18.2	27.6
1963	5,827	1,973	7,800	2,719	232	732	37.9	20.8	32.5
1964	7,253	2,471	9,724	2,733	242	756	38.1	21.7	33.6
1965	8,059	3,140	11,199	2,916	289	821	40.7	25.9	36.4
1966	7,674	3,301	10,975	2,643	278	742	36.9	25.0	32.9
1967	9,904	4,610	14,514	3,374	370	944	47.1	33.3	41.9
1968	10,069	4,571	14,640	3,432	364	946	47.9	32.7	42.0
1969	10,127	4,658	14,785	3,207	339	874	44.7	30.4	38.8
1970	13,033	5,532	18,565	3,970	369	1,017	55.4	33.2	45.1
1971	14,565	6,183	20,748	4,667	429	1,184	65.1	38.6	52.5
1972	13,857	5,740	19,597	4,588	443	1,226	64.0	39.8	54.4
1973	15,780	8,059	23,839	5,069	581	1,404	70.7	52.2	62.3
1974	20,547	13,192	33,739	6,240	867	1,823	87.0	77.9	80.9
1975	24,851	16,642	41,493	7,170	1,113	2,253	100.0	100.0	100.0
1976	34,375	23,819	58,194	9,223	1,473	2,925	128.6	132.3	129.8
1977	42,922	31,968	74,890	10,320	1,873	3,528	143.9	168.3	156.6
1978	40,539	34,870	75,409	10,279	2,275	3,913	143.4	204.4	173.7
1979	47,499	42,803	90,302	11,459	2,687	4,498	159.8	241.4	199.7
1980	59,352	51,728	111,080	13,682	3,265	5,504	190.8	293.3	244.3
1981	..	..	124,419	..	..	6,220	..	..	276.1
1982	..	..	132,158	..	..	7,639	..	..	339.1
1983	..	..	139,706	..	..	8,419	..	..	373.7
1984	..	..	139,441	..	..	8,925	..	..	396.1
1985	..	..	152,825	..	..	10,278	..	..	456.2

TABLE A.38 - INDICES OF MINERAL OUTPUT PRICES (1975 = 100)

YEAR	NON-FERROUS BASE METALS	PRECIOUS METALS	FERROUS BASE METALS	NON-METAL-LICS	ROCK AND SEMI-PRECIOUS STONES	TOTAL OTHER MINING	SOURCES OF ENERGY	TOTAL NON-DIAMOND MINING	PRECIOUS STONES	TOTAL MINING
1950	53.5	33.3	-	53.7	5.1	53.2	-	53.2	32.7	38.3
1951	77.2	-	-	70.4	10.0	77.0	-	77.0	46.6	56.8
1952	79.7	-	-	68.2	21.4	79.4	-	79.4	49.4	60.2
1953	80.6	-	-	94.6	23.2	80.8	-	80.8	45.0	56.6
1954	82.9	-	171.4	92.6	43.1	83.0	-	83.0	45.2	56.4
1955	84.8	-	-	87.2	35.1	84.6	-	84.6	45.4	58.1
1956	92.4	-	-	75.7	35.1	91.8	-	91.8	46.2	60.5
1957	63.1	-	-	65.2	37.4	63.1	-	63.1	45.6	51.4
1958	53.3	-	-	58.5	28.3	53.3	-	53.3	45.7	48.1
1959	68.6	-	-	48.8	37.0	68.0	-	68.0	44.5	51.7
1960	52.3	-	-	54.0	16.3	51.8	-	51.8	42.6	45.4
1961	55.7	-	-	46.2	40.2	55.4	-	55.4	46.9	49.4
1962	48.5	47.4	-	49.2	15.2	48.1	-	48.1	45.4	46.3
1963	54.7	-	107.8	50.4	27.6	54.4	-	54.4	41.6	46.6
1964	45.3	30.3	163.9	56.5	29.7	45.4	-	45.4	50.0	48.4
1965	49.4	31.1	92.3	55.9	28.9	49.2	-	49.2	54.0	52.3
1966	52.2	29.5	93.1	58.8	24.4	52.0	-	52.0	63.4	59.0
1967	53.4	36.3	91.4	55.6	49.4	53.1	-	53.1	59.8	57.4
1968	70.8	47.3	90.0	59.9	53.4	69.2	-	69.2	63.0	65.1
1969	65.7	39.7	92.7	65.9	24.6	63.6	-	63.6	56.4	58.7
1970	70.1	39.0	93.8	67.2	41.8	68.0	-	68.0	49.1	55.9
1971	55.7	31.6	94.2	71.5	27.1	54.8	-	54.8	56.0	55.5
1972	67.8	37.6	94.1	78.0	42.5	66.6	-	66.6	79.0	74.1
1973	90.7	60.5	94.0	63.2	47.8	88.6	-	88.6	96.2	92.9
1974	118.4	91.7	97.3	93.8	84.1	116.7	76.8	116.7	103.5	109.7
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	116.8	118.7	103.0	113.1	88.0	116.5	213.9	126.1	139.3	134.0
1977	112.8	131.2	106.0	134.9	105.2	113.9	328.9	166.3	225.3	198.5
1978	114.9	133.0	109.5	123.8	91.3	117.2	333.0	175.2	238.2	208.0
1979	162.7	246.6	112.0	145.1	128.9	172.9	384.9	250.1	305.0	276.1
1980	155.6	448.4	115.6	161.5	121.6	182.0	458.1	293.5	349.0	319.7
1981	145.2	269.6	118.1	183.7	166.5	161.1	513.1	297.9	226.5	268.4
1982	150.4	270.8	121.0	189.7	195.7	162.0	621.1	322.0	241.3	293.7
1983	159.9	385.6	125.0	229.3	130.8	181.5	572.4	314.2	258.9	295.6
1984	193.3	364.1	117.4	231.4	201.1	208.2	734.7	397.0	291.6	361.1
1985	290.0	442.1	120.5	234.4	226.8	298.2	1059.5	549.4	437.5	510.8

TABLE A.39 - VALUE ADDED DEFLATORS OF MINING AND THE REST OF THE ECONOMY

YEAR	MINING: GVA AT CURRENT PRICES	MINING: GVA AT CONSTANT 1975 PRICES	MINING: GVA DEFLATOR	REST OF ECONOMY: GVA AT CURRENT PRICES	REST OF ECONOMY: GVA AT CONSTANT 1975 PRICES	REST OF ECONOMY: GVA DEFLATOR	MINING'S DOMESTIC PRICE TERMS OF TRADE *
	R ' m	R ' m	Index: 1975=100	R ' m	R ' m	Index: 1975=100	Index: 1975=100
1950	17.3	43.5	39.8	37.9	110.5	34.3	116.0
1951	29.6	45.8	64.6	46.3	129.1	35.9	180.2
1952	32.6	50.5	64.6	51.7	141.1	36.6	176.2
1953	33.0	55.1	59.9	58.8	150.8	39.0	153.6
1954	34.5	60.1	57.4	65.1	165.6	39.3	146.0
1955	49.3	73.4	67.2	73.4	195.7	37.5	179.1
1956	60.0	88.3	68.0	74.0	191.9	38.6	176.2
1957	51.0	90.7	56.2	78.7	201.8	39.0	144.2
1958	42.9	81.0	53.0	77.5	195.9	39.6	133.9
1959	47.8	82.3	58.1	69.2	163.0	42.5	136.8
1960	39.6	82.8	47.8	70.8	154.5	45.8	104.4
1961	43.8	79.7	55.0	106.5	259.5	41.0	133.9
1962	48.2	95.1	50.7	111.6	233.7	47.8	106.1
1963	57.8	115.5	50.0	129.2	296.2	43.6	114.7
1964	83.3	143.1	58.2	135.3	296.0	45.7	127.4
1965	95.7	155.8	61.4	149.2	309.4	48.2	127.4
1966	116.7	170.3	68.5	156.1	308.9	50.5	135.6
1967	115.3	159.6	72.2	170.2	320.4	53.1	136.0
1968	115.4	159.0	72.6	203.8	376.1	54.2	133.9
1969	119.0	182.3	65.3	215.4	384.7	56.0	116.6
1970	103.0	175.4	58.7	233.7	391.1	59.8	98.3
1971	84.1	160.2	52.5	257.8	413.8	62.3	84.3
1972	112.7	155.1	72.7	298.2	423.7	70.4	103.2
1973	186.4	163.9	113.7	347.8	408.9	85.1	133.7
1974	169.1	168.2	100.5	400.1	428.7	93.3	107.7
1975	174.2	174.2	100.0	470.5	470.5	100.0	100.0
1976	215.1	169.9	126.6	543.0	483.2	112.4	112.7
1977	388.8	221.9	175.2	563.1	455.8	123.5	141.8
1978	531.3	219.7	241.8	606.7	451.0	134.5	179.8
1979	584.3	211.7	276.0	689.7	461.2	149.5	184.6
1980	630.0	202.3	311.4	779.1	441.6	176.4	176.5
1981	454.4	181.9	249.8	1001.5	479.4	208.9	119.6
1982	465.7	169.2	275.2	1198.5	496.0	241.6	113.9
1983	473.3	166.2	284.8	1285.7	475.8	270.2	105.4
1984	510.4	159.0	321.0	1437.4	481.0	298.8	107.4
1985	908.1	157.5	576.6	1603.8	485.3	330.5	174.5

* MINING'S GVA-DEFLATOR DIVIDED BY GVA-DEFLATOR OF REST OF ECONOMY.

TABLE A.40 - FOREIGN TRADE: INDICES OF VOLUME AND PRICES (1975 = 100)

YEAR	EXPORTS				IMPORTS		TERMS OF TRADE *	
	EXCLUDING MINERALS		INCLUDING MINERALS					
	VOLUME	PRICE	VOLUME	PRICE	VOLUME	PRICE	EXCLU-DING MINERALS	INCLU-DING MINERALS
1970	104.3	52.1	98.0	54.5	58.9	57.9	90.0	94.1
1971	119.6	58.2	96.0	56.8	74.8	60.9	95.6	93.3
1972	132.5	67.1	102.5	70.5	73.6	65.7	102.1	107.3
1973	103.7	77.0	101.4	87.0	68.6	72.4	106.4	120.2
1974	84.1	89.2	86.3	101.1	91.7	84.7	105.3	119.4
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	95.4	114.4	94.0	125.4	95.8	115.9	98.7	108.2
1977	89.9	114.6	107.4	173.1	102.3	129.6	88.4	133.6
1978	93.8	120.5	122.6	185.1	85.8	142.6	84.5	129.8
1979	87.9	137.6	108.2	233.6	90.4	166.2	82.8	140.6
1980	91.3	153.1	108.2	260.1	109.7	190.8	80.2	136.3
1981	98.8	180.0	100.2	234.3	114.2	215.8	83.4	108.6
1982	84.3	220.5	95.7	274.1	107.5	246.7	89.4	111.1
1983	63.6	244.1	85.4	280.1	91.9	272.6	89.5	102.8
1984	62.5	279.3	83.1	339.0	94.7	294.6	94.8	115.1
1985	76.4	257.2	91.7	434.1	86.2	349.9	73.5	124.1

YEAR	MINERAL EXPORTS						TERMS OF TRADE *		
	DIAMONDS		OTHER MINERALS		ALL MINERALS				
	VOLUME	PRICE	VOLUME	PRICE	VOLUME	PRICE	DIAMONDS	OTHER MINERALS	ALL MINERALS
1970	90.4	49.1	100.1	68.1	93.8	56.2	84.8	117.6	97.1
1971	69.4	56.0	100.5	54.7	80.4	55.4	92.0	89.8	91.0
1972	79.0	79.0	88.9	66.6	82.5	74.2	120.2	101.4	112.9
1973	107.0	96.3	86.5	88.6	99.8	93.9	133.0	122.4	129.7
1974	83.2	103.5	96.0	116.7	87.7	108.6	122.2	137.8	128.2
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	91.5	139.3	95.9	121.4	93.0	132.8	120.2	104.7	114.6
1977	105.8	225.3	143.3	171.1	119.0	202.3	173.8	132.0	156.1
1978	124.9	238.2	172.7	180.6	141.8	213.5	167.0	126.6	149.7
1979	89.7	305.0	180.8	256.3	121.7	279.6	183.5	154.2	168.2
1980	81.8	349.0	188.5	288.6	119.4	315.4	182.9	151.3	165.3
1981	65.2	226.5	167.3	300.2	101.1	269.4	105.0	139.1	124.8
1982	57.8	241.3	187.2	338.4	103.3	303.2	97.8	137.2	122.9
1983	58.0	258.9	176.9	318.4	99.8	296.0	95.0	116.8	108.6
1984	50.8	291.6	181.7	402.1	96.8	364.5	99.0	136.5	123.7
1985	57.9	437.6	179.5	574.1	101.9	522.1	125.1	164.1	149.2

* EXPORT PRICE INDICES DIVIDED BY RESPECTIVE IMPORT PRICE INDICES.

TABLE A.41 - PRICE INDICES OF INPUTS IN DIAMOND MINING (1975 = 100)

YEAR	INTERMEDIATE INPUTS: Services	Elec-tricity	Machinery (non-electric)	Trade	Petro-leum products	Chemicals and chemical products	Rubber	All other products	WEIGHTED AVERAGE	Remune-ration of employ-ees
WEIGHTS:	27.3	16.5	14.2	10.7	6.5	3.8	3.5	17.5	100.0	
1962	39.3	55.3	43.9	48.5	43.6	50.5	52.8	51.9	47.0	29.1
1963	41.7	56.3	44.2	48.2	44.0	50.8	53.1	52.5	47.9	34.5
1964	43.5	56.5	45.5	48.5	44.3	51.4	53.7	53.8	49.0	35.3
1965	45.8	56.4	46.9	48.4	44.4	53.1	55.5	55.8	50.3	37.8
1966	45.6	60.3	48.4	52.4	45.2	55.2	57.7	57.8	52.0	33.3
1967	51.1	63.7	49.1	56.7	46.1	56.5	59.1	59.7	55.2	44.0
1968	54.1	65.6	49.3	61.0	46.1	56.5	59.1	60.7	57.0	43.0
1969	56.8	67.9	50.1	66.1	46.3	57.6	60.2	63.0	59.2	39.2
1970	63.6	68.1	51.8	69.8	46.9	59.0	61.7	66.9	62.6	47.0
1971	70.0	71.7	54.9	69.2	48.5	60.5	63.4	70.7	66.2	54.7
1972	76.2	79.1	59.0	75.0	50.4	62.5	65.0	74.5	71.2	56.3
1973	83.3	85.9	64.9	86.4	56.3	67.1	70.4	80.4	78.1	67.1
1974	97.0	91.4	78.5	96.4	82.9	80.8	89.7	88.6	90.1	73.5
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	108.2	134.9	117.9	110.1	126.1	109.8	111.1	111.8	116.1	120.2
1977	115.1	211.3	129.3	125.4	146.2	123.0	127.1	125.8	138.7	129.3
1978	124.3	231.5	142.2	135.2	151.6	135.7	139.3	139.1	151.0	154.0
1979	139.1	251.2	162.0	150.9	233.2	155.3	154.3	157.6	172.6	179.1
1980	154.9	261.8	180.8	186.1	281.5	182.1	177.9	177.3	193.5	203.0
1981	183.1	295.3	200.1	216.9	307.4	199.1	189.3	203.5	220.1	246.4
1982	227.9	356.0	230.5	238.7	343.1	230.1	212.2	235.2	258.9	258.6
1983	252.6	427.8	252.1	264.9	346.7	253.3	227.8	263.3	289.9	292.9
1984	294.9	475.4	271.0	255.6	353.6	269.3	240.3	287.3	316.7	305.4
1985	335.1	566.5	333.7	291.8	487.3	320.7	271.5	321.6	373.2	353.6

TABLE A.42 - PRICE INDICES OF INPUTS IN URANIUM MINING (1975 = 100)

YEAR	INTERMEDIATE INPUTS											Remuneration of employees
	Services	Machinery (non-electric)	Metal products excl machinery and equipm.	Electricity	Chemicals and chemical products	Trade	Petroleum products	Electrical machinery	Basic metal industries	All other products	WEIGHTED AVERAGE	
WEIGHTS:	21.3	15.6	8.8	8.4	7.6	6.4	6.3	3.4	3.3	18.9	100.0	
1962	-	-	-	-	-	-	-	-	-	-	-	-
1963	-	-	-	-	-	-	-	-	-	-	-	-
1964	-	-	-	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	-	-	-	-	-	-
1966	-	-	-	-	-	-	-	-	-	-	-	-
1967	-	-	-	-	-	-	-	-	-	-	-	-
1968	-	-	-	-	-	-	-	-	-	-	-	-
1969	-	-	-	-	-	-	-	-	-	-	-	-
1970	-	-	-	-	-	-	-	-	-	-	-	-
1971	-	-	-	-	-	-	-	-	-	-	-	-
1972	-	-	-	-	-	-	-	-	-	-	-	-
1973	83.3	64.9	67.2	85.9	67.1	86.4	56.3	79.3	83.6	80.4	75.8	74.4
1974	97.0	78.5	79.8	91.4	80.8	96.4	82.9	90.1	110.4	88.6	88.6	77.5
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	108.2	117.9	115.1	134.9	109.8	110.1	126.1	112.1	121.8	111.8	115.2	113.6
1977	115.1	129.3	131.5	211.3	123.0	125.4	146.2	118.3	138.2	125.8	133.0	132.9
1978	124.3	142.2	149.4	231.5	135.7	135.2	151.6	124.8	150.1	139.1	145.3	146.5
1979	139.1	162.0	172.3	251.2	155.3	150.9	233.2	151.8	165.7	157.6	167.7	210.7
1980	154.9	180.8	195.4	261.8	182.1	186.1	281.5	169.5	191.8	177.3	189.5	269.8
1981	183.1	200.1	221.1	295.3	199.1	216.9	307.4	185.4	204.6	203.5	214.4	313.1
1982	227.9	230.5	259.5	356.0	230.1	238.7	343.1	208.8	233.7	235.2	250.9	365.9
1983	252.6	252.1	295.3	427.8	253.3	264.9	346.7	233.4	254.6	263.3	279.2	434.1
1984	294.9	271.0	316.0	475.4	269.3	255.6	353.6	289.2	287.5	287.3	305.6	486.7
1985	335.1	333.7	347.7	566.5	320.7	291.8	487.3	301.0	361.8	321.6	358.3	605.8

TABLE A.43 - PRICE INDICES OF INPUTS IN OTHER MINING (EXCLUDING URANIUM MINING) (1975 = 100)

YEAR	INTERMEDIATE INPUTS										Remuneration of employees
	Machinery (non-electric)	Services	Electricity	Trade	Chemicals and chemical products	Petroleum products	Other mining	Metal products excl. machinery and equipm.	All other products	WEIGHTED AVERAGE	
WEIGHTS:	17.6	17.4	13.9	9.6	6.8	5.8	5.6	4.1	19.2	100.0	
1962	43.9	39.3	55.3	48.5	50.5	43.6	48.1	43.8	51.9	47.3	27.3
1963	44.2	41.7	56.3	48.2	50.8	44.0	54.4	44.6	52.5	48.4	31.8
1964	45.5	43.5	56.5	48.5	51.4	44.3	45.4	45.9	53.8	48.9	33.3
1965	46.9	45.8	56.4	48.4	53.1	44.4	49.2	47.3	55.8	50.3	37.1
1966	48.4	45.6	60.3	52.4	55.2	45.2	52.0	48.6	57.8	52.2	33.2
1967	49.1	51.1	63.7	56.7	56.5	46.1	53.1	48.5	59.7	54.8	42.4
1968	49.3	54.1	65.6	61.0	56.5	46.1	69.2	49.0	60.7	57.1	42.0
1969	50.1	56.8	67.9	66.1	57.6	46.3	63.6	50.6	63.0	58.8	39.1
1970	51.8	63.6	68.1	69.8	59.0	46.9	68.1	53.7	66.9	61.9	47.3
1971	54.9	70.0	71.7	69.2	60.5	48.5	54.7	57.1	70.7	64.4	57.7
1972	59.0	76.2	79.1	75.0	62.5	50.4	66.6	59.9	74.5	69.5	60.2
1973	64.9	83.3	85.9	86.4	67.1	56.3	88.6	67.2	80.4	77.1	61.0
1974	78.5	97.0	91.4	96.4	80.8	82.9	116.7	79.8	88.6	89.8	85.8
1975	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1976	117.9	108.2	134.9	110.1	109.8	126.1	116.5	115.1	111.8	116.4	150.7
1977	129.3	115.1	211.3	125.4	123.0	146.2	113.9	131.5	125.8	137.0	169.9
1978	142.2	124.3	231.5	135.2	135.7	151.6	117.2	149.4	139.1	149.2	185.8
1979	162.0	139.1	251.2	150.9	155.3	233.2	172.9	172.3	157.6	173.2	161.3
1980	180.8	154.9	261.8	186.1	182.1	281.5	182.0	195.4	177.3	194.0	178.4
1981	200.1	183.1	295.3	216.9	199.1	307.4	161.1	221.1	203.5	217.5	208.2
1982	230.5	227.9	356.0	238.7	230.1	343.1	162.0	259.5	235.2	253.0	264.0
1983	252.1	252.6	427.8	264.9	253.3	346.7	181.5	295.3	263.3	283.4	321.8
1984	271.0	294.9	475.4	255.6	269.3	353.6	208.2	316.0	287.3	308.2	324.9
1985	333.7	335.1	566.5	291.8	320.7	487.3	298.2	347.7	321.6	366.6	377.1

TABLE A.44 - PRODUCTION ACCOUNTS AT CONSTANT 1975 PRICES - R millions

YEAR	TOTAL MINING: INTERMEDIATE INPUT	TOTAL MINING: GROSS VALUE ADDED: REMUNERATION OF EMPLOYEES	TOTAL MINING: GROSS VALUE ADDED: GROSS OPERATING SURPLUS	TOTAL MINING: GROSS VALUE ADDED: TOTAL GROSS VALUE ADDED	TOTAL MINING: NET INDIRECT TAXES	TOTAL MINING: GROSS INPUT = GROSS OUTPUT	DIAMOND MINING: INTERMEDIATE INPUT	DIAMOND MINING: GROSS VALUE ADDED: REMUNERATION OF EMPLOYEES	DIAMOND MINING: GROSS VALUE ADDED: GROSS OPERATING SURPLUS	DIAMOND MINING: GROSS VALUE ADDED: TOTAL GROSS VALUE ADDED	DIAMOND MINING: NET INDIRECT TAXES	DIAMOND MINING: GROSS INPUT = GROSS OUTPUT	NON-DIAMOND MINING: INTERMEDIATE INPUT	NON-DIAMOND MINING: GROSS VALUE ADDED: REMUNERATION OF EMPLOYEES	NON-DIAMOND MINING: GROSS VALUE ADDED: GROSS OPERATING SURPLUS	NON-DIAMOND MINING: GROSS VALUE ADDED: TOTAL GROSS VALUE ADDED	NON-DIAMOND MINING: NET INDIRECT TAXES	NON-DIAMOND MINING: GROSS INPUT = GROSS OUTPUT
1962	30.6	33.6	70.5	104.1	7.3	142.0	17.7	18.9	45.3	64.2	7.1	89.0	12.9	14.7	25.2	39.9	0.2	53.0
1963	14.3	33.3	94.7	128.0	10.3	152.6	5.8	18.8	74.9	93.7	10.1	109.6	8.5	14.5	19.8	34.3	0.2	43.0
1964	21.4	39.6	133.8	173.4	12.7	207.5	12.4	21.0	81.8	102.8	12.6	127.8	9.0	18.6	52.0	70.6	0.1	79.7
1965	35.6	41.9	140.3	182.2	8.7	226.5	24.5	22.0	87.8	109.8	8.3	142.6	11.1	19.9	52.5	72.4	0.4	83.9
1966	39.8	45.4	148.8	194.2	14.5	248.5	23.3	23.7	90.7	114.4	13.9	151.6	16.5	21.7	58.1	79.8	0.6	96.9
1967	21.2	47.1	153.2	200.3	15.4	236.9	13.9	24.5	102.1	126.6	15.2	155.7	7.3	22.6	51.1	73.7	0.2	81.2
1968	32.6	47.3	125.2	172.5	15.5	220.6	21.6	24.2	84.3	108.5	15.1	145.2	11.0	23.1	40.9	64.0	0.4	75.4
1969	39.0	51.3	150.6	201.9	14.3	255.2	24.2	25.5	106.2	131.7	13.8	169.7	14.8	25.8	44.4	70.2	0.5	85.5
1970	39.7	54.7	131.6	186.3	14.9	240.9	24.6	25.5	88.3	113.8	14.1	152.5	15.1	29.2	43.3	72.5	0.8	88.4
1971	39.0	51.8	106.6	158.4	14.7	212.1	11.9	22.3	68.1	90.4	13.8	116.1	27.1	29.5	38.5	68.0	0.9	96.0
1972	48.7	46.8	103.9	150.7	12.9	212.3	10.5	19.2	82.9	102.1	12.0	124.6	38.2	27.6	21.0	48.6	0.9	87.7
1973	48.9	50.1	140.9	191.0	16.4	256.3	3.4	20.9	124.1	145.0	15.5	163.9	45.5	29.2	16.8	46.0	0.9	92.4
1974	77.6	54.6	86.0	140.6	14.3	232.5	32.0	23.1	71.2	94.3	13.4	139.7	45.6	31.5	14.8	46.3	0.9	92.8
1975	67.4	54.5	119.7	174.2	13.6	255.2	19.4	23.4	99.1	122.5	12.7	154.6	48.0	31.1	20.6	51.7	0.9	100.6
1976	94.4	57.9	88.3	146.2	16.7	257.3	28.4	23.2	78.9	102.1	15.7	146.2	66.0	34.7	9.4	44.1	1.0	111.1
1977	149.3	68.6	79.9	148.5	10.1	307.9	59.5	25.4	73.3	98.7	9.0	167.2	89.8	43.2	6.6	49.8	1.1	140.7
1978	92.0	64.1	160.7	224.8	21.9	338.7	14.5	26.2	132.2	158.4	20.7	193.6	77.5	37.9	28.5	66.4	1.2	145.1
1979	126.5	67.9	96.8	164.7	16.6	307.8	25.4	28.0	74.6	102.6	15.4	143.4	101.1	39.9	22.2	62.1	1.2	164.4
1980	132.4	67.4	81.7	149.1	15.5	297.0	23.0	27.3	66.8	94.1	14.3	131.4	109.4	40.1	14.9	55.0	1.2	165.6
1981	110.0	66.1	82.8	148.9	12.0	270.9	18.4	25.2	56.5	81.7	10.7	110.8	91.6	40.9	26.3	67.2	1.3	160.1
1982	104.0	57.9	80.1	138.0	10.7	252.7	17.6	20.7	39.9	60.6	9.3	87.5	86.4	37.2	40.2	77.4	1.4	165.2
1983	82.3	55.4	103.9	159.3	11.6	253.2	8.6	20.0	48.6	68.6	10.2	87.4	73.7	35.4	55.3	90.7	1.4	165.8
1984	115.9	52.5	66.6	119.1	9.1	244.1	17.2	19.6	35.3	54.9	8.0	80.1	98.7	32.9	31.3	64.2	1.1	164.0
1985	101.8	50.0	92.3	142.3	10.7	254.8	7.5	19.2	55.3	74.5	9.5	91.5	94.3	30.8	37.0	67.8	1.2	163.3

TABLE A.45 - PRICE INDICES OF INPUTS AND OUTPUTS IN MINING : 1975 = 100

TOTAL MINING

YEAR	INTERMEDIATE INPUT	GROSS VALUE ADDED: REMUNERATION OF EMPLOYEES	GROSS VALUE ADDED: GROSS OPERATING SURPLUS	GROSS VALUE ADDED: TOTAL GROSS VALUE ADDED	NET INDIRECT TAXES	GROSS INPUT = GROSS OUTPUT
1962	47.1	28.3	54.9	46.3	45.2	46.4
1963	48.3	33.3	49.3	45.2	41.7	45.2
1964	49.1	34.3	52.1	48.0	49.6	48.2
1965	50.3	37.5	57.0	52.5	54.0	52.2
1966	52.0	33.3	68.3	60.1	62.8	59.0
1967	55.2	43.3	61.9	57.6	59.7	57.5
1968	57.1	42.5	76.1	66.9	62.6	65.1
1969	59.0	39.2	65.7	58.9	56.6	58.8
1970	62.0	47.2	58.7	55.3	49.7	56.0
1971	64.6	56.4	51.5	53.1	56.5	55.4
1972	69.6	58.5	82.1	74.8	78.3	73.8
1973	76.9	63.5	109.7	97.6	95.1	93.5
1974	89.0	80.6	145.5	120.3	102.8	108.8
1975	100.0	100.0	100.0	100.0	100.0	100.0
1976	115.9	133.2	156.3	147.1	138.3	135.1
1977	136.5	147.5	359.9	261.8	214.9	199.5
1978	148.0	164.3	265.1	236.3	232.9	212.1
1979	171.8	180.4	477.1	354.8	296.4	276.4
1980	191.2	208.8	598.9	422.5	334.8	314.8
1981	216.5	246.7	351.8	305.2	226.7	265.7
1982	252.8	288.6	372.0	337.0	243.0	298.4
1983	282.0	341.3	273.5	297.1	260.3	290.5
1984	307.9	358.3	483.9	428.5	290.1	362.0
1985	363.7	425.4	753.4	638.2	431.8	519.8

DIAMOND MINING

YEAR	INTERMEDIATE INPUT	GROSS VALUE ADDED: REMUNERATION OF EMPLOYEES	GROSS VALUE ADDED: GROSS OPERATING SURPLUS	GROSS VALUE ADDED: TOTAL GROSS VALUE ADDED	NET INDIRECT TAXES	GROSS INPUT = GROSS OUTPUT
1962	47.0	29.1	51.7	45.0	45.4	45.4
1963	47.9	34.5	42.9	41.2	41.6	41.6
1964	49.0	35.3	53.9	50.1	50.0	50.0
1965	50.3	37.8	59.1	54.8	54.0	54.0
1966	52.0	33.3	74.2	65.7	63.4	63.4
1967	55.2	44.0	64.2	60.3	59.8	59.8
1968	57.0	43.0	70.3	64.2	63.0	63.0
1969	59.2	39.2	59.9	55.9	56.4	56.4
1970	62.6	47.0	46.1	46.3	49.1	49.1
1971	66.2	54.7	54.8	54.8	56.0	56.0
1972	71.2	56.3	85.2	79.7	78.9	78.9
1973	78.1	67.1	101.7	96.7	96.2	96.2
1974	90.1	73.5	119.7	108.4	103.5	103.5
1975	100.0	100.0	100.0	100.0	100.0	100.0
1976	116.1	120.2	153.4	145.8	139.3	139.3
1977	138.7	129.3	328.6	277.3	225.3	225.3
1978	151.0	154.0	264.4	246.1	238.2	238.2
1979	172.6	179.1	396.8	337.4	305.0	305.0
1980	193.5	203.0	462.9	387.5	349.0	349.0
1981	220.1	246.4	220.0	228.0	226.5	226.5
1982	258.9	258.6	224.6	236.1	241.3	241.3
1983	289.9	292.9	239.1	255.0	258.9	258.9
1984	316.7	305.4	271.4	383.6	291.6	291.6
1985	373.2	353.6	475.0	443.6	437.5	437.5

NON-DIAMOND MINING

YEAR	INTERMEDIATE INPUT	GROSS VALUE ADDED: REMUNERATION OF EMPLOYEES	GROSS VALUE ADDED: GROSS OPERATING SURPLUS	GROSS VALUE ADDED: TOTAL GROSS VALUE ADDED	NET INDIRECT TAXES	GROSS INPUT = GROSS OUTPUT
1962	47.3	27.3	60.7	48.4	47.3	48.1
1963	48.4	31.8	73.7	56.0	48.4	54.4
1964	48.9	33.3	49.2	45.0	48.9	45.4
1965	50.3	37.1	53.5	49.0	50.3	49.2
1966	52.2	33.2	59.0	52.0	52.2	52.0
1967	54.8	42.4	57.5	52.9	54.8	53.1
1968	57.1	42.0	88.0	71.4	57.1	69.2
1969	58.8	39.1	79.5	64.7	58.8	63.6
1970	61.7	47.3	84.3	69.4	61.7	68.0
1971	64.1	57.7	45.7	50.9	64.1	54.8
1972	69.3	60.2	70.0	64.4	69.3	66.6
1973	76.8	61.0	169.0	100.4	76.8	88.6
1974	89.0	85.7	269.6	114.5	89.0	116.7
1975	100.0	100.0	100.0	100.0	100.0	100.0
1976	115.9	141.8	180.9	150.1	115.9	126.1
1977	134.9	158.3	707.6	231.1	134.9	166.3
1978	147.4	171.5	317.5	213.0	147.4	175.2
1979	171.2	181.2	746.8	383.4	171.2	250.1
1980	190.8	212.7	1208.7	482.5	175.0	287.6
1981	215.6	247.2	635.0	399.0	223.1	292.6
1982	251.5	305.4	518.4	416.0	250.0	328.6
1983	281.0	368.4	303.8	329.0	278.6	307.2
1984	306.3	389.7	723.6	552.5	290.9	402.6
1985	362.9	470.5	1169.5	851.9	375.0	566.0

TABLE A.46 - MINING'S INCOME AND EXPENDITURE ACCOUNT - R millions

YEAR	CURRENT INCOME: NET OPERATING SURPLUS	CURRENT INCOME: INCOME FROM PROPERTY RECEIVED: INTEREST	CURRENT INCOME: INCOME FROM PROPERTY RECEIVED: DIVIDENDS	CURRENT INCOME: INCOME FROM PROPERTY RECEIVED: RENT AND ROYALTIES	CURRENT INCOME: INCOME FROM PROPERTY RECEIVED: TOTAL	TOTAL CURRENT INCOME	CURRENT EXPENDITURE: INCOME FROM PROPERTY PAID: INTEREST	CURRENT EXPENDITURE: INCOME FROM PROPERTY PAID: DIVIDENDS	CURRENT EXPENDITURE: INCOME FROM PROPERTY PAID: RENT AND ROYALTIES	CURRENT EXPENDITURE: INCOME FROM PROPERTY PAID: TOTAL	DIRECT TAXES	CURRENT TRANSFERS TO HOUSEHOLDS	CURRENT TRANSFER TO REST OF THE WORLD	TOTAL CURRENT EXPENDITURE	CORPORATE SAVING
A. TOTAL MINING															
1970	71.9	1.5	14.3	0.1	15.9	87.8	1.2	32.9	3.0	37.1	36.1	0.1	0.1	73.4	14.4
1971	49.4	1.1	15.7	0.1	16.9	66.3	0.7	37.6	3.0	41.3	33.9	0.1	0.1	75.4	-9.1
1972	79.4	1.1	24.5	0.1	25.7	105.1	0.7	31.9	3.0	35.6	18.4	0.1	0.1	54.2	50.9
1973	147.6	1.5	29.4	0.1	31.0	178.6	1.4	38.3	2.9	42.6	37.4	0.1	0.1	80.2	98.4
1974	115.3	1.5	28.1	0.1	29.7	145.0	2.4	48.6	3.0	54.0	68.8	0.2	0.1	123.1	21.9
1975	108.9	2.1	10.1	0.1	12.3	121.2	4.3	35.2	3.1	42.6	39.9	0.2	0.1	82.8	38.4
1976	120.3	3.3	2.9	0.2	6.4	126.7	13.8	61.6	4.2	79.6	31.7	0.9	0.1	112.3	14.4
1977	265.6	7.8	0.4	0.3	8.5	274.1	20.3	83.7	4.9	108.9	39.9	1.5	0.1	150.4	123.7
1978	400.3	11.1	0.6	0.3	12.0	412.3	30.9	131.6	5.9	168.4	127.6	2.1	0.1	298.2	114.1
1979	432.5	10.1	0.7	0.9	11.7	444.2	24.3	140.0	5.6	169.9	150.2	1.4	0.3	321.8	122.4
1980	457.1	8.6	0.7	1.6	10.9	468.0	14.0	125.4	7.5	146.9	119.5	1.7	0.3	268.4	199.6
1981	253.6	11.3	1.5	1.9	14.7	268.3	12.7	85.2	8.7	106.6	60.1	2.0	0.3	169.0	99.3
1982	257.4	9.0	1.6	2.9	13.5	270.9	16.6	94.5	7.3	118.4	27.2	7.0	2.9	155.5	115.4
1983	241.9	12.8	1.8	2.8	17.4	259.3	15.0	56.5	7.1	78.6	23.7	2.0	0.2	104.5	154.8
1984	278.7	23.4	2.7	3.7	29.8	308.5	18.2	100.6	6.8	125.6	106.7	2.0	0.1	234.4	74.1
1985	650.7	40.2	8.7	5.0	53.9	704.6	18.7	301.5	9.8	330.0	121.1	6.8	0.2	458.1	246.5
B. DIAMOND MINING															
1970	38.9	0.4	13.5	0.0	13.9	52.8	-	11.7	2.3	14.0	27.2	0.1	0.0	41.3	11.5
1971	35.5	0.4	15.2	0.0	15.6	51.1	-	26.6	2.4	29.0	23.6	0.1	0.0	52.7	-1.6
1972	68.4	0.7	24.2	0.0	24.9	93.3	-	27.5	2.4	29.9	14.9	0.1	0.0	44.9	48.4
1973	123.6	0.8	29.2	0.0	30.0	153.6	0.0	30.6	2.4	33.0	34.8	0.1	0.0	67.9	85.7
1974	81.2	0.8	27.3	0.0	28.1	109.3	-	31.9	2.3	34.2	61.1	0.2	0.0	95.5	13.8
1975	94.0	0.9	9.8	0.0	10.7	104.7	-	31.5	2.3	33.8	32.8	0.2	0.0	66.8	37.9
1976	114.3	2.0	2.6	0.0	4.6	118.9	-	58.7	3.0	61.7	30.8	0.7	-	93.2	25.7
1977	232.5	6.1	-	0.1	6.2	238.7	0.0	78.6	3.7	82.3	39.7	1.2	-	123.2	115.5
1978	339.4	8.5	-	0.1	8.6	348.0	0.0	117.6	4.3	121.9	126.6	1.7	-	250.2	97.8
1979	284.9	6.1	-	0.6	6.7	291.6	0.1	115.3	3.6	119.0	144.1	0.7	0.2	264.0	27.6
1980	295.9	6.0	-	0.6	6.6	302.5	0.0	85.0	4.0	89.0	103.0	0.8	0.2	193.0	109.5
1981	109.9	7.1	-	0.7	7.8	117.7	0.0	30.3	4.5	34.8	55.6	0.9	0.2	91.5	26.2
1982	74.8	3.0	0.0	0.8	3.8	78.6	1.1	10.3	4.7	16.1	26.9	4.8	0.4	48.2	30.4
1983	101.1	3.2	-	0.8	4.0	105.1	0.6	29.0	4.3	33.9	21.0	1.2	0.2	56.3	48.8
1984	80.5	6.1	-	0.8	6.9	87.4	0.2	31.5	4.2	35.9	36.4	0.8	0.1	73.2	14.2
1985	247.1	17.8	-	0.8	18.6	265.7	0.0	67.2	4.7	71.9	42.9	0.6	0.2	115.6	150.1
C. NON-DIAMOND MINING															
1970	33.0	1.1	0.8	0.1	2.0	35.0	1.2	21.2	0.7	23.1	8.9	0.0	0.1	32.1	2.9
1971	13.9	0.7	0.5	0.1	1.3	15.2	0.7	11.0	0.6	12.3	10.3	0.0	0.1	22.7	-7.5
1972	11.0	0.4	0.3	0.1	0.8	11.8	0.7	4.4	0.6	5.7	3.5	0.0	0.1	9.3	2.5
1973	24.0	0.7	0.2	0.1	1.0	25.0	1.4	7.7	0.5	9.6	2.6	0.0	0.1	12.3	12.7
1974	34.1	0.7	0.8	0.1	1.6	35.7	2.4	16.7	0.7	19.8	7.7	0.0	0.1	27.6	8.1
1975	14.9	1.2	0.3	0.1	1.6	16.5	4.3	3.7	0.8	8.8	7.1	0.0	0.1	16.0	0.5
1976	6.0	1.3	0.3	0.2	1.8	7.8	13.8	2.9	1.2	17.9	0.9	0.2	0.1	19.1	-11.3
1977	33.1	1.7	0.4	0.2	2.3	35.4	20.3	5.1	1.2	26.6	0.2	0.3	0.1	27.2	8.2
1978	60.9	2.6	0.6	0.2	3.4	64.3	30.9	14.0	1.6	46.5	1.0	0.4	0.1	48.0	16.3
1979	147.6	4.0	0.7	0.3	5.0	152.6	24.2	24.7	2.0	50.9	6.1	0.7	0.1	57.8	94.8
1980	161.2	2.6	0.7	1.0	4.3	165.5	14.0	40.4	3.5	57.9	16.5	0.9	0.1	75.4	90.1
1981	143.7	4.2	1.5	1.2	6.9	150.6	12.7	54.9	4.2	71.8	4.5	1.1	0.1	77.5	73.1
1982	182.6	6.0	1.6	2.1	9.7	192.3	15.5	84.2	2.6	102.3	0.3	2.2	2.5	107.3	85.0
1983	140.8	9.6	1.8	2.0	13.4	154.2	14.4	27.5	2.8	44.7	2.7	0.8	-	48.2	106.0
1984	198.2	17.3	2.7	2.9	22.9	221.1	18.0	69.1	2.6	89.7	70.3	1.2	-	161.2	59.9
1985	403.6	22.4	8.7	4.2	35.3	438.9	18.7	234.3	5.1	258.1	78.2	6.2	-	342.5	96.4

TABLE A.47 - SOURCE AND APPLICATION OF TOTAL INCOME OF MINING - R MILLIONS

	DIAMOND MINING			NON-DIAMOND MINING			TOTAL MINING		
	1970-'77	1978-'85	1970-'85	1970-'77	1978-'85	1970-'85	1970-'77	1978-'85	1970-'85
SOURCE OF TOTAL INCOME:									
FINAL OUTPUT:									
Exports	1252.4	2664.0	3916.4	706.5	4073.1	4779.6	1958.9	6737.1	8696.0
Consumption	-	-	-	0.4	2.2	2.6	0.4	2.2	2.6
Change in inventories ..	23.0	15.9	38.9	70.5	71.0	141.5	93.5	86.9	180.4
INTERMEDIATE OUTPUT	-	-	-	66.1	105.7	171.8	66.1	105.7	171.8
PROPERTY INCOME RECEIVED:									
Interest	12.1	57.8	69.9	7.8	68.7	76.5	19.9	126.5	146.4
Dividends	121.8	0.0	121.8	3.6	18.3	21.9	125.4	18.3	143.7
Rent and royalties	0.1	5.2	5.3	1.0	13.9	14.9	1.1	19.1	20.2
TOTAL INCOME	1409.4	2742.9	4152.3	855.9	4352.9	5208.8	2265.3	7095.8	9361.1
APPLICATION OF TOTAL INCOME:									
INTERMEDIATE INPUT	196.6	304.5	501.1	374.4	1762.4	2136.8	571.0	2066.9	2637.9
REMUNERATION OF EMPLOYEES	150.1	447.8	597.9	240.9	840.8	1081.7	391.0	1288.6	1679.6
PROVISION FOR DEPRECIATION	32.6	109.8	142.4	51.6	186.2	237.8	84.2	296.0	380.2
PROPERTY INCOME PAID:									
Interest	0.0	2.0	2.0	44.8	148.4	193.2	44.8	150.4	195.2
Dividends	297.1	486.2	783.3	72.7	549.1	621.8	369.8	1035.3	1405.1
Rent and royalties	20.8	34.3	55.1	6.3	24.4	30.7	27.1	58.7	85.8
TAXES PAID:									
Direct taxes	264.9	556.5	821.4	41.2	179.6	220.8	306.1	736.1	1042.2
Indirect taxes	107.7	284.2	391.9	6.8	23.9	30.7	114.5	308.1	422.6
CURRENT TRANSFERS:									
To households	2.7	11.5	14.2	0.5	13.5	14.0	3.2	25.0	28.2
To the rest of the world	0.0	1.5	1.5	0.8	2.9	3.7	0.8	4.4	5.2
TOTAL SAVING	336.9	504.6	841.5	15.9	621.7	637.6	352.8	1126.3	1479.1
TOTAL EXPENDITURE	1409.4	2742.9	4152.3	855.9	4352.9	5208.8	2265.3	7095.8	9361.1

TABLE A.47(a) - PERCENTAGE COMPOSITION OF SOURCE AND APPLICATION OF TOTAL INCOME OF MINING

	DIAMOND MINING			NON-DIAMOND MINING			TOTAL MINING		
	1970-'77	1978-'85	1970-'85	1970-'77	1978-'85	1970-'85	1970-'77	1978-'85	1970-'85
SOURCE OF TOTAL INCOME:									
FINAL OUTPUT:									
Exports	88.9	97.1	94.3	82.5	93.6	91.8	86.5	94.9	92.9
Consumption	-	-	-	.0	0.1	.0	.0	.0	.0
Change in inventories ..	1.6	0.6	0.9	8.2	1.6	2.7	4.1	1.2	1.9
INTERMEDIATE OUTPUT	-	-	-	7.7	2.4	3.3	2.9	1.5	1.8
PROPERTY INCOME RECEIVED:									
Interest	0.9	2.1	1.7	0.9	1.6	1.5	0.9	1.8	1.6
Dividends	8.6	0.0	2.9	0.4	0.4	0.4	5.5	0.3	1.5
Rent and royalties	.0	0.2	0.1	0.1	0.3	0.3	.0	0.3	0.2
TOTAL INCOME	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
APPLICATION OF TOTAL INCOME:									
INTERMEDIATE INPUT	13.9	11.1	12.1	43.7	40.5	41.0	25.2	29.1	28.2
REMUNERATION OF EMPLOYEES	10.6	16.3	14.4	28.1	19.3	20.8	17.3	18.2	17.9
PROVISION FOR DEPRECIATION	2.3	4.0	3.4	6.0	4.3	4.6	3.7	4.2	4.1
PROPERTY INCOME PAID:									
Interest	0.0	0.1	.0	5.2	3.4	3.7	2.0	2.1	2.1
Dividends	21.1	17.7	18.9	8.5	12.6	11.9	16.3	14.6	15.0
Rent and royalties	1.5	1.3	1.3	0.7	0.6	0.6	1.2	0.8	0.9
TAXES PAID:									
Direct taxes	18.8	20.3	19.8	4.8	4.1	4.2	13.5	10.4	11.1
Indirect taxes	7.6	10.4	9.4	0.8	0.5	0.6	5.1	4.3	4.5
CURRENT TRANSFERS:									
To households	0.2	0.4	0.3	0.1	0.3	0.3	0.1	0.4	0.3
To the rest of the world	0.0	0.1	.0	0.1	0.1	0.1	.0	0.1	0.1
TOTAL SAVING	23.9	18.4	20.3	1.9	14.3	12.2	15.6	15.9	15.8
TOTAL EXPENDITURE	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE A.48 – MINING'S CAPITAL FORMATION AND FINANCE ACCOUNT – R millions

YEAR	GROSS INVESTMENT: GROSS FIXED INVESTMENT	GROSS INVESTMENT: CHANGE IN INVENTORIES	GROSS INVESTMENT: TOTAL GROSS INVESTMENT	GROSS SAVING: CORPORATE SAVING	GROSS SAVING: PROVISION FOR DEPRECIATION	GROSS SAVING: TOTAL GROSS SAVING	NET LENDING (–) / NET BORROWING (+)
A. TOTAL MINING							
1970	12.3	5.9	18.2	14.4	5.2	19.6	-1.4
1971	6.0	8.1	14.1	-9.1	5.4	-3.7	17.8
1972	10.6	3.1	13.7	50.9	5.8	56.7	-43.0
1973	18.3	1.5	19.8	98.4	6.8	105.2	-85.4
1974	59.6	10.8	70.4	21.9	9.3	31.2	39.2
1975	121.2	1.0	122.2	38.4	12.5	50.9	71.3
1976	100.2	40.0	140.2	14.4	17.4	31.8	108.4
1977	78.8	23.1	101.9	123.7	21.8	145.5	-43.6
1978	90.2	-19.9	70.3	114.1	25.6	139.7	-69.4
1979	52.5	20.1	72.6	122.4	29.3	151.7	-79.1
1980	112.4	17.2	129.6	199.6	32.2	231.8	-102.2
1981	74.6	51.4	126.0	99.3	37.7	137.0	-11.0
1982	47.6	-15.5	32.1	115.4	40.6	156.0	-123.9
1983	40.6	-1.4	39.2	154.8	42.3	197.1	-157.9
1984	31.9	19.1	51.0	74.1	43.6	117.7	-66.7
1985	31.9	15.9	47.8	246.5	44.7	291.2	-243.4
B. DIAMOND MINING							
1970	5.7	5.5	11.2	11.5	1.8	13.3	-2.1
1971	1.9	4.1	6.0	-1.6	1.8	0.2	5.8
1972	6.3	0.8	7.1	48.4	2.2	50.6	-43.5
1973	8.7	-3.4	5.3	85.7	2.6	88.3	-83.0
1974	27.3	9.8	37.1	13.8	4.0	17.8	19.3
1975	19.0	-1.8	17.2	37.9	5.1	43.0	-25.8
1976	29.5	4.4	33.9	25.7	6.7	32.4	1.5
1977	30.4	3.6	34.0	115.5	8.4	123.9	-89.9
1978	36.7	-4.3	32.4	97.8	10.2	108.0	-75.6
1979	20.4	9.9	30.3	27.6	11.1	38.7	-8.4
1980	48.7	12.2	60.9	109.5	13.3	122.8	-61.9
1981	28.9	20.2	49.1	26.2	14.4	40.6	8.5
1982	12.0	-6.7	5.3	30.4	14.8	45.2	-39.9
1983	6.3	-8.5	-2.2	48.8	15.1	63.9	-66.1
1984	6.9	1.9	8.8	14.2	15.3	29.5	-20.7
1985	9.7	-8.8	0.9	150.1	15.6	165.7	-164.8
C. NON-DIAMOND MINING							
1970	6.6	0.4	7.0	2.9	3.4	6.3	0.7
1971	4.1	4.0	8.1	-7.5	3.6	-3.9	12.0
1972	4.3	2.3	6.6	2.5	3.6	6.1	0.5
1973	9.6	4.9	14.5	12.7	4.2	16.9	-2.4
1974	32.3	1.0	33.3	8.1	5.3	13.4	19.9
1975	102.2	2.8	105.0	0.5	7.4	7.9	97.1
1976	70.7	35.6	106.3	-11.3	10.7	-0.6	106.9
1977	48.4	19.5	67.9	8.2	13.4	21.6	46.3
1978	53.5	-15.6	37.9	16.3	15.4	31.7	6.2
1979	32.1	10.2	42.3	94.8	18.2	113.0	-70.7
1980	63.7	5.0	68.7	90.1	18.9	109.0	-40.3
1981	45.7	31.2	76.9	73.1	23.3	96.4	-19.5
1982	35.6	-8.8	26.8	85.0	25.8	110.8	-84.0
1983	34.3	7.1	41.4	106.0	27.2	133.2	-91.8
1984	25.0	17.2	42.2	59.9	28.3	88.2	-46.0
1985	22.2	24.7	46.9	96.4	29.1	125.5	-78.6

TABLE A.49 – BUDGETED AND ACTUAL GOVERNMENT REVENUE FROM MINING

YEAR ENDING 31 MARCH	REVENUE FROM MINING R ' 000		DEVIATION OF ACTUAL FROM BUDGETED AMOUNTS	
	BUDGET	ACTUAL	R ' 000	PERCENTAGE
1970	39,194	40,597	1,403	3.6%
1971	45,832	41,611	(4,221)	-9.2%
1972	30,381	30,995	614	2.0%
1973	27,563	35,458	7,895	28.6%
1974	47,552	60,616	13,064	27.5%
1975	75,424	69,792	(5,632)	-7.5%
1976	58,343	54,740	(3,603)	-6.2%
1977	51,138	66,054	14,916	29.2%
1978	81,610	112,095	30,485	37.4%
1979	178,860	200,239	21,379	12.0%
1980	212,250	182,853	(29,397)	-13.9%
1981	165,000	151,171	(13,829)	-8.4%
1982	140,999	70,356	(70,643)	-50.1%
1983	37,277	48,314	11,037	29.6%
1984	71,000	86,738	15,738	22.2%
1985	104,800	133,898	29,098	27.8%
1986	170,000	241,843	71,843	42.3%
TOTAL	1,537,223	1,627,370	90,147	5.9%

TABLE A.50 - CENTRAL GOVERNMENT REVENUE FROM MINING - R ' 000

YEAR ENDING 31 MARCH	INCOME TAX				DIAMOND EXPORT DUTY	TOTAL REVENUE FROM MINING	TOTAL CENTRAL GOVERN-MENT REVENUE
	DIAMOND MINING		URANIUM MINING	OTHER MINING			
	COMPANY TAX	DIAMOND PROFITS TAX					
1950	223	454	-	n/a	844	1,521	7,129
1951	-	1,525	-	n/a	1,368	2,893	9,594
1952	271	1,853	-	n/a	1,655	3,779	12,426
1953	1,981	2,061	-	n/a	2,252	6,294	17,806
1954	2,143	2,009	-	n/a	2,105	6,257	18,125
1955	2,759	2,457	-	n/a	2,546	7,762	19,662
1956	3,375	3,347	-	n/a	3,166	9,888	24,075
1957	4,605	4,006	-	n/a	3,448	12,059	32,427
1958	5,324	3,687	-	n/a	3,262	12,273	32,318
1959	4,906	2,872	-	n/a	3,192	10,970	30,645
1960	3,831	3,669	-	n/a	2,780	10,280	30,693
1961	4,897	3,500	-	n/a	3,220	11,617	33,086
1962	4,671	4,261	-	n/a	3,452	12,384	31,476
1963	8,518	3,407	-	n/a	3,513	15,438	36,121
1964	6,824	4,661	-	n/a	4,377	15,862	39,634
1965	9,324	5,688	-	n/a	6,467	21,479	54,016
1966	11,388	7,495	-	n/a	4,652	23,535	68,874
1967	14,997	9,501	-	n/a	9,009	33,507	79,389
1968	19,007	8,925	-	n/a	7,718	35,650	88,466
1969	17,855	7,984	-	n/a	8,303	34,142	88,948
1970	15,980	8,833	-	6,746	9,038	40,597	71,348
1971	20,601	4,877	-	10,864	5,269	41,611	77,335
1972	11,497	5,100	-	6,611	7,787	30,995	74,941
1973	11,962	10,746	-	3,342	9,408	35,458	74,146
1974	25,438	17,304	-	1,671	16,203	60,616	103,527
1975	41,066	9,026	-	7,996	11,704	69,792	125,899
1976	22,522	11,881	-	7,153	13,184	54,740	129,283
1977	30,756	13,740	-	319	21,239	66,054	158,321
1978	39,834	32,195	-	63	40,003	112,095	198,984
1979	114,009	40,772	-	1,346	44,112	200,239	307,852
1980	98,943	34,760	-	8,106	41,044	182,853	313,960
1981	68,239	32,720	-	16,645	33,567	151,171	311,677
1982	22,699	25,188	-	1,951	20,518	70,356	640,394
1983	17,574	6,711	2,000	339	21,690	48,314	661,735
1984	13,647	12,944	36,340	711	23,096	86,738	801,655
1985	38,192	8,727	60,000	5,915	21,064	133,898	1,016,610
1986	19,461	30,386	150,000	3,228	38,768	241,843	1,197,852
1987*	35,000	20,000	120,000	5,000	30,000	210,000	1,336,780

* = Budgeted amounts; n/a = not available

TABLE A. 50(a) - MINING'S PERCENTAGE CONTRIBUTION TO CENTRAL GOVERNMENT REVENUE

YEAR ENDING 31 MARCH	INCOME TAX: DIAMOND MINING: COMPANY TAX	INCOME TAX: DIAMOND MINING: DIAMOND PROFITS TAX	INCOME TAX: URANIUM MINING	INCOME TAX: OTHER MINING	DIAMOND EXPORT DUTY	MINING'S TOTAL % CONTRIBUTION
1950	3.1	6.4	-	n/a	11.8	21.3
1951	0.0	15.9	-	n/a	14.3	30.2
1952	2.2	14.9	-	n/a	13.3	30.4
1953	11.1	11.6	-	n/a	12.6	35.3
1954	11.8	11.1	-	n/a	11.6	34.5
1955	14.0	12.5	-	n/a	12.9	39.5
1956	14.0	13.9	-	n/a	13.2	41.1
1957	14.2	12.4	-	n/a	10.6	37.2
1958	16.5	11.4	-	n/a	10.1	38.0
1959	16.0	9.4	-	n/a	10.4	35.8
1960	12.5	12.0	-	n/a	9.1	33.5
1961	14.8	10.6	-	n/a	9.7	35.1
1962	14.8	13.5	-	n/a	11.0	39.3
1963	23.6	9.4	-	n/a	9.7	42.7
1964	17.2	11.8	-	n/a	11.0	40.0
1965	17.3	10.5	-	n/a	12.0	39.8
1966	16.5	10.9	-	n/a	6.8	34.2
1967	18.9	12.0	-	n/a	11.3	42.2
1968	21.5	10.1	-	n/a	8.7	40.3
1969	20.1	9.0	-	n/a	9.3	38.4
1970	22.4	12.4	-	9.5	12.7	56.9
1971	26.6	6.3	-	14.0	6.8	53.8
1972	15.3	6.8	-	8.8	10.4	41.4
1973	16.1	14.5	-	4.5	12.7	47.8
1974	24.6	16.7	-	1.6	15.7	58.6
1975	32.6	7.2	-	6.4	9.3	55.4
1976	17.4	9.2	-	5.5	10.2	42.3
1977	19.4	8.7	-	0.2	13.4	41.7
1978	20.0	16.2	-	.0	20.1	56.3
1979	37.0	13.2	-	0.4	14.3	65.0
1980	31.5	11.1	-	2.6	13.1	58.2
1981	21.9	10.5	-	5.3	10.8	48.5
1982	3.5	3.9	-	0.3	3.2	11.0
1983	2.7	1.0	0.3	0.1	3.3	7.3
1984	1.7	1.6	4.5	0.1	2.9	10.8
1985	3.8	0.9	5.9	0.6	2.1	13.2
1986	1.6	2.5	12.5	0.3	3.2	20.2
1987*	2.6	1.5	9.0	0.4	2.2	15.7

* = Budgeted amounts; n/a = not available

TABLE A.51 - NET MINING INCOME AND DIRECT AND INDIRECT TAXES

YEAR	TOTAL CURRENT INCOME BEFORE TAXES			DIRECT TAXES			INDIRECT TAXES			DIRECT AND INDIRECT TAXES		
	DIAMOND MINING	NON-DIAMOND MINING	TOTAL MINING	DIAMOND MINING	NON-DIAMOND MINING	TOTAL MINING	DIAMOND MINING	NON-DIAMOND MINING	TOTAL MINING	DIAMOND MINING	NON-DIAMOND MINING	TOTAL MINING
	R millions											
1970	59.7	35.5	95.2	27.2	8.9	36.1	6.9	0.5	7.4	34.1	9.4	43.5
1971	58.8	15.8	74.6	23.6	10.3	33.9	7.7	0.6	8.3	31.3	10.9	42.2
1972	102.8	12.4	115.2	14.9	3.5	18.4	9.5	0.6	10.1	24.4	4.1	28.5
1973	168.5	25.7	194.2	34.8	2.6	37.4	14.9	0.7	15.6	49.7	3.3	53.0
1974	123.2	36.5	159.7	61.1	7.7	68.8	13.9	0.8	14.7	75.0	8.5	83.5
1975	117.4	17.4	134.8	32.8	7.1	39.9	12.7	0.9	13.6	45.5	8.0	53.5
1976	140.8	9.0	149.8	30.8	0.9	31.7	21.9	1.2	23.1	52.7	2.1	54.8
1977	258.9	36.9	295.8	39.7	0.2	39.9	20.2	1.5	21.7	59.9	1.7	61.6
1978	397.3	66.0	463.3	126.6	1.0	127.6	49.3	1.7	51.0	175.9	2.7	178.6
1979	338.7	154.7	493.4	144.1	6.1	150.2	47.1	2.1	49.2	191.2	8.2	199.4
1980	352.3	167.6	519.9	103.0	16.5	119.5	49.8	2.1	51.9	152.8	18.6	171.4
1981	142.0	153.5	295.5	55.6	4.5	60.1	24.3	2.9	27.2	79.9	7.4	87.3
1982	101.1	195.8	296.9	26.9	0.3	27.2	22.5	3.5	26.0	49.4	3.8	53.2
1983	131.4	158.1	289.5	21.0	2.7	23.7	26.3	3.9	30.2	47.3	6.6	53.9
1984	110.6	224.3	334.9	36.4	70.3	106.7	23.2	3.2	26.4	59.6	73.5	133.1
1985	307.4	443.4	750.8	42.9	78.2	121.1	41.7	4.5	46.2	84.6	82.7	167.3
TOTAL	2910.9	1752.6	4663.5	821.4	220.8	1042.2	391.9	30.7	422.6	1213.3	251.5	1464.8
	TAXES AS PERCENTAGE OF TOTAL CURRENT INCOME											
1970	100.0	100.0	100.0	45.6	25.1	37.9	11.6	1.4	7.8	57.1	26.5	45.7
1971	100.0	100.0	100.0	40.1	65.2	45.4	13.1	3.8	11.1	53.2	69.0	56.6
1972	100.0	100.0	100.0	14.5	28.2	16.0	9.2	4.8	8.8	23.7	33.1	24.7
1973	100.0	100.0	100.0	20.7	10.1	19.3	8.8	2.7	8.0	29.5	12.8	27.3
1974	100.0	100.0	100.0	49.6	21.1	43.1	11.3	2.2	9.2	60.9	23.3	52.3
1975	100.0	100.0	100.0	27.9	40.8	29.6	10.8	5.2	10.1	38.8	46.0	39.7
1976	100.0	100.0	100.0	21.9	10.0	21.2	15.6	13.3	15.4	37.4	23.3	36.6
1977	100.0	100.0	100.0	15.3	0.5	13.5	7.8	4.1	7.3	23.1	4.6	20.8
1978	100.0	100.0	100.0	31.9	1.5	27.5	12.4	2.6	11.0	44.3	4.1	38.5
1979	100.0	100.0	100.0	42.5	3.9	30.4	13.9	1.4	10.0	56.5	5.3	40.4
1980	100.0	100.0	100.0	29.2	9.8	23.0	14.1	1.3	10.0	43.4	11.1	33.0
1981	100.0	100.0	100.0	39.2	2.9	20.3	17.1	1.9	9.2	56.3	4.8	29.5
1982	100.0	100.0	100.0	26.6	0.2	9.2	22.3	1.8	8.8	48.9	1.9	17.9
1983	100.0	100.0	100.0	16.0	1.7	8.2	20.0	2.5	10.4	36.0	4.2	18.6
1984	100.0	100.0	100.0	32.9	31.3	31.9	21.0	1.4	7.9	53.9	32.8	39.7
1985	100.0	100.0	100.0	14.0	17.6	16.1	13.6	1.0	6.2	27.5	18.7	22.3
AVERAGE	100.0	100.0	100.0	28.2	12.6	22.3	47.7	13.9	40.5	309.6	819.2	346.6

TABLE A.52 - VALUE OF MINERAL EXPORTS BY STAGE OF PROCESSING

YEAR	PROCESSED		SEMI-PROCESSED		RAW MATERIALS		TOTAL
	R mill.	%	R mill.	%	R mill.	%	R mill.
1950	0.0	0.0	8.4	38.2	13.6	61.8	22.0
1951	0.0	0.0	13.3	40.1	19.9	59.9	33.2
1952	0.0	0.0	18.9	42.6	25.5	57.4	44.4
1953	0.0	0.0	17.0	39.4	26.1	60.6	43.1
1954	0.0	0.0	18.9	40.2	28.1	59.8	47.0
1955	0.0	0.0	24.5	41.2	34.9	58.8	59.4
1956	0.0	0.0	32.2	44.3	40.5	55.7	72.7
1957	0.0	0.0	24.4	37.8	40.1	62.2	64.5
1958	0.0	0.0	17.3	33.9	33.7	66.1	51.0
1959	0.0	0.0	19.0	35.3	34.8	64.7	53.8
1960	0.0	0.0	16.3	31.5	35.5	68.5	51.8
1961	0.4	0.7	15.6	27.2	41.3	72.1	57.3
1962	1.7	3.1	15.8	28.7	37.5	68.2	55.0
1963	8.2	11.8	12.6	18.2	48.4	69.9	69.2
1964	21.7	21.9	10.5	10.6	67.1	67.6	99.3
1965	30.5	25.7	13.2	11.1	75.0	63.2	118.7
1966	32.3	23.2	12.6	9.1	94.2	67.7	139.1
1967	34.2	23.6	7.8	5.4	102.7	71.0	144.7
1968	36.9	27.6	9.3	6.9	87.7	65.5	133.9
1969	40.3	27.5	13.9	9.5	92.6	63.1	146.8
1970	44.2	34.7	13.1	10.3	69.9	55.0	127.2
1971	33.6	31.3	12.5	11.6	61.4	57.1	107.5
1972	36.8	24.9	13.2	8.9	97.8	66.2	147.8
1973	51.4	22.7	13.0	5.7	161.7	71.5	226.1
1974	73.6	32.0	19.3	8.4	137.0	59.6	229.9
1975	68.1	28.2	13.5	5.6	159.7	66.2	241.3
1976	78.7	26.4	17.1	5.7	202.3	67.9	298.1
1977	184.7	31.8	20.4	3.5	375.9	64.7	581.0
1978	242.3	33.2	20.0	2.7	467.8	64.1	730.1
1979	371.0	45.2	21.7	2.6	428.3	52.2	821.0
1980	441.0	48.5	18.6	2.0	448.8	49.4	908.4
1981	401.2	61.0	23.7	3.6	232.5	35.4	657.4
1982	511.5	67.4	27.1	3.6	219.9	29.0	758.5
1983	452.0	62.8	25.2	3.5	243.1	33.7	720.3
1984	582.2	67.9	33.7	3.9	242.0	28.2	857.9
1985	823.2	64.1	49.2	3.8	411.0	32.0	1283.4

TABLE A.52(a) – VALUE OF MINERAL EXPORTS BY STAGE OF PROCESSING (EXCLUDING DIAMONDS AND URANIUM)

YEAR	PROCESSED		SEMI-PROCESSED		RAW MATERIALS		TOTAL
	R mill.	%	R mill.	%	R mill.	%	R mill.
1950	0.0	0.0	8.4	91.3	0.8	8.7	9.2
1951	0.0	0.0	13.3	91.7	1.2	8.3	14.5
1952	0.0	0.0	18.9	90.0	2.1	10.0	21.0
1953	0.0	0.0	17.0	85.4	2.9	14.6	19.9
1954	0.0	0.0	18.9	90.9	1.9	9.1	20.8
1955	0.0	0.0	24.5	92.8	1.9	7.2	26.4
1956	0.0	0.0	32.2	94.4	1.9	5.6	34.1
1957	0.0	0.0	24.4	89.1	3.0	10.9	27.4
1958	0.0	0.0	17.3	84.8	3.1	15.2	20.4
1959	0.0	0.0	19.0	95.0	1.0	5.0	20.0
1960	0.0	0.0	16.3	92.6	1.3	7.4	17.6
1961	0.4	2.2	15.6	87.2	1.9	10.6	17.9
1962	1.7	9.6	15.8	88.8	0.3	1.7	17.8
1963	8.2	38.9	12.6	59.7	0.3	1.4	21.1
1964	21.7	66.0	10.5	31.9	0.7	2.1	32.9
1965	30.5	68.8	13.2	29.8	0.6	1.4	44.3
1966	32.3	70.8	12.6	27.6	0.7	1.5	45.6
1967	34.2	80.3	7.8	18.3	0.6	1.4	42.6
1968	36.9	79.0	9.3	19.9	0.5	1.1	46.7
1969	40.3	73.5	13.9	25.4	0.6	1.1	54.8
1970	44.2	76.5	13.1	22.7	0.5	0.9	57.8
1971	33.6	72.1	12.5	26.8	0.5	1.1	46.6
1972	36.8	72.3	13.2	25.9	0.9	1.8	50.9
1973	51.4	78.7	13.0	19.9	0.9	1.4	65.3
1974	73.6	77.4	19.3	20.3	2.2	2.3	95.1
1975	68.1	82.5	13.5	16.4	0.9	1.1	82.5
1976	69.9	79.5	17.1	19.5	0.9	1.0	87.9
1977	78.3	78.6	20.4	20.5	0.9	0.9	99.6
1978	98.9	82.6	20.0	16.7	0.9	0.8	119.8
1979	138.7	86.0	21.7	13.5	0.9	0.6	161.3
1980	158.0	88.4	18.6	10.4	2.1	1.2	178.7
1981	113.2	81.8	23.7	17.1	1.5	1.1	138.4
1982	132.5	82.0	27.1	16.8	2.0	1.2	161.6
1983	151.1	81.0	25.2	13.5	10.3	5.5	186.6
1984	165.0	78.9	33.7	16.1	10.4	5.0	209.1
1985	238.5	82.3	49.2	17.0	2.0	0.7	289.7

TABLE A.53 – MINERAL EXPORTS BY COUNTRY OF DESTINATION (EXCLUDING DIAMOND AND URANIUM EXPORTS) – R ' 000

COUNTRY		1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	TOTAL: 1970-1984	% TOTAL: 1970-198
EUROPE:																		
EUROPEAN	France	90	408	56	55	87	126	2,244	1,649	11,698	393	5	14	–	–	–	16,825	1.0%
COMMUNITY:	West Germany	5,614	3,695	2,004	4,802	8,048	11,015	19,013	20,988	24,595	23,736	27,874	21,795	35,411	37,061	53,228	298,879	17.3%
	Italy	3,803	3,481	3,459	4,725	4,145	2,666	2,619	7,351	10,189	16,455	15,738	7,613	6,130	5,834	1,159	95,367	5.5%
	Netherlands	1,006	955	655	759	125	757	4,411	857	3,666	185	243	20	175	14	29	13,857	0.8%
	Belgium	4,009	6,052	12,745	8,908	9,195	3,941	17,482	20,155	6,617	21,326	44,159	34,030	32,749	68,984	52,841	343,193	19.8%
	Britain	2,209	2,235	1,714	2,697	4,701	1,383	6,118	15,666	12,099	8,954	453	344	574	1,363	8,826	69,336	4.0%
	Denmark	669	711	408	598	331	154	58	–	–	–	–	–	–	–	–	2,929	0.2%
TOTAL EUROPEAN COMMUNITY...		17,400	17,537	21,041	22,544	26,632	20,042	51,945	66,666	68,864	71,049	88,472	63,816	75,039	113,256	116,083	840,386	48.6%
OTHER	Spain	–	–	–	–	–	–	1	–	–	8,806	2,129	–	33	79	22	11,070	0.6%
WESTERN	Greece	50	216	477	538	301	–	–	290	–	–	–	–	–	–	–	1,872	0.1%
EUROPE:	Finland	355	111	151	190	2,219	138	485	–	–	–	–	–	–	–	–	3,649	0.2%
	Norway	234	262	288	264	672	340	393	83	–	–	–	–	–	–	–	2,536	0.1%
	Sweden	–	–	16	170	–	–	–	–	–	–	–	–	–	–	–	186	.0%
	Austria	–	–	–	–	–	–	–	–	4,862	6,754	8,036	11,154	19,907	10,816	15,468	76,997	4.5%
	Switzerland	–	51	–	–	–	–	–	–	9	3	1	7	2	–	–	73	.0%
TOTAL OTHER WESTERN EUROPE.		639	640	932	1,162	3,192	478	879	373	4,871	15,563	10,166	11,161	19,942	10,895	15,490	96,383	5.6%
TOTAL OTHER EUROPE.........		175	499	210	281	729	1,457	455	–	–	–	12	–	–	–	–	3,818	0.3%
TOTAL EUROPE................		18,214	18,676	22,183	23,987	30,553	21,977	53,279	67,039	73,735	86,612	98,650	74,977	94,981	124,151	131,573	940,587	54.4%
AMERICA:	U.S.A.	14,890	9,725	9,753	13,999	22,798	26,621	350	381	2	2	431	863	596	106	4,001	104,518	6.0%
	Other	–	–	–	–	–	6	–	–	–	–	–	1	–	–	–	7	.0%
TOTAL AMERICA...............		14,890	9,725	9,753	13,999	22,798	26,627	350	381	2	2	431	864	596	106	4,001	104,525	6.0%
OCEANIA:	Australia	5	13	9	25	37	3	1	–	–	–	24	1	6	16	10	150	.0%
	Other	–	–	5	–	–	–	–	–	–	–	–	–	–	–	–	5	.0%
TOTAL OCEANIA...............		5	13	14	25	37	3	1	–	–	–	24	1	6	16	10	155	.0%
ASIA:	Japan	16,370	9,232	7,592	10,157	12,463	9,282	7,994	6,274	13,742	28,152	30,487	15,132	21,792	19,195	18,046	225,910	13.1%
	Other	–	–	–	–	11	12	6	–	34	208	128	182	138	181	45	945	0.1%
TOTAL ASIA..................		16,370	9,232	7,592	10,157	12,474	9,294	8,000	6,274	13,776	28,360	30,615	15,314	21,930	19,376	18,091	226,855	13.1%
AFRICA:	South Africa	8,263	8,987	10,689	16,826	29,120	26,906	28,200	27,231	32,919	45,675	48,471	46,811	40,535	33,147	48,975	452,755	26.2%
	Other	43	11	12	15	86	61	114	684	751	381	456	480	432	498	252	4,276	0.2%
TOTAL AFRICA................		8,306	8,998	10,701	16,841	29,206	26,967	28,314	27,915	33,670	46,056	48,927	47,291	40,967	33,645	49,227	457,031	26.4%
TOTAL: EXPORTS.............		57,785	46,644	50,243	65,009	95,068	84,868	89,944	101,609	121,183	161,030	178,647	138,447	158,480	177,294	202,902	1,729,153	100.0%

TABLE A.54 - SUMMARY OF VALUE OF MINERAL EXPORTS BY COUNTRY OF DESTINATION (EXCLUDING DIAMOND AND URANIUM EXPORTS) - R ' 000

	COUNTRY	1970-1977		COUNTRY	1978-1984		COUNTRY	1970-1984
1	SOUTH AFRICA	156,222	1	SOUTH AFRICA	296,533	1	SOUTH AFRICA	452,755
2	U.S.A.	98,517	2	BELGIUM	260,706	2	BELGIUM	343,193
3	BELGIUM	82,487	3	WEST GERMANY	223,700	3	WEST GERMANY	298,879
4	JAPAN	79,364	4	JAPAN	146,546	4	JAPAN	225,910
5	WEST GERMANY	75,179	5	AUSTRIA	76,997	5	U.S.A.	104,518
6	BRITAIN	36,723	6	ITALY	63,118	6	ITALY	95,367
7	ITALY	32,249	7	BRITAIN	32,613	7	AUSTRIA	76,997
8	NETHERLANDS	9,525	8	FRANCE	12,110	8	BRITAIN	69,336
9	FRANCE	4,715	9	SPAIN	11,069	9	FRANCE	16,825
10	POLAND	3,806	10	U.S.A.	6,001	10	NETHERLANDS	13,857
11	FINLAND	3,649	11	NETHERLANDS	4,332	11	SPAIN	11,070
12	DENMARK	2,929	12	ZAIRE	2,711	12	POLAND	3,818
13	NORWAY	2,536	13	SOUTH KOREA	312	13	FINLAND	3,649
14	GREECE	1,872	14	TAIWAN	261	14	DENMARK	2,929
15	ZIMBABWE	923	15	ZIMBABWE	261	15	ZAIRE	2,727
16	SWEDEN	186	16	MALAWI	190	16	NORWAY	2,536
17	AUSTRALIA	93	17	HONG-KONG	189	17	GREECE	1,872
18	SWITZERLAND	51	18	ISRAEL	154	18	ZIMBABWE	1,184
19	ANGOLA	33	19	AUSTRALIA	57	19	SOUTH KOREA	312
20	CONGO	29	20	CHAD	33	20	TAIWAN	272
21	HONG-KONG	16	21	BOPUTHATSWANA	25	21	HONG-KONG	205
22	ZAIRE	16	22	SWITZERLAND	22	22	MALAWI	190
23	BOTSWANA	14	23	MAURITIUS	14	23	SWEDEN	186
24	TAIWAN	11	24	POLAND	12	24	ISRAEL	156
25	MOZAMBIQUE	8	25	C.A.R	10	25	AUSTRALIA	150
26	CANADA	6	26	REUNION	6	26	SWITZERLAND	73
27	NEW ZEALAND	5	27	CANADA	1	27	CHAD	33
28	ZAMBIA	3				28	ANGOLA	33
29	ISRAEL	2				29	CONGO	29
30	SPAIN	1				30	BOPUTHATSWANA	25
						31	MAURITIUS	14
						32	BOTSWANA	14
						33	C.A.R	10
						34	MOZAMBIQUE	8
						35	CANADA	7
						36	REUNION	6
						37	NEW ZEALAND	5
						38	ZAMBIA	3
	TOTAL EXPORTS 1970-1977	591,170		TOTAL EXPORTS 1978-1984	1,137,983		TOTAL EXPORTS 1970-1984	1,729,153

TABLE A.55 - FOREIGN LIABILITIES OF THE MINING INDUSTRY, 31 DECEMBER 1980

	R MILLIONS	AS % OF TOTAL
DIRECT INVESTMENT:		
Long-term:	868.7	74.7
Ordinary and other shares (nominal value)	102.7	8.8
Share premium, reserves and undistributed profits .	760.8	65.4
Branch and partnership balances	1.5	0.1
Debentures, loan-stock and similar securities	0.1	.0
Mortgages and long-term loans	3.6	0.3
Short-term	10.9	0.9
TOTAL DIRECT INVESTMENT	879.6	75.7
NON-DIRECT INVESTMENT:		
Long-term:	238.2	20.5
Ordinary and other shares (nominal value)	22.8	2.0
Share premium, reserves and undistributed profits .	33.2	2.9
Debentures, loan-stock and similar securities	-	-
Mortgages and long-term loans	182.2	15.7
Short-term	44.9	3.9
TOTAL NON-DIRECT INVESTMENT	283.1	24.3
TOTAL INVESTMENT:		
Long-term:	1106.9	95.2
Ordinary and other shares (nominal value)	125.5	10.8
Share premium, reserves and undistributed profits .	794.0	68.3
Branch and partnership balances	1.5	0.1
Debentures, loan-stock and similar securities	0.1	.0
Mortgages and long-term loans	185.8	16.0
Short-term	55.8	4.8
TOTAL INVESTMENT	1162.7	100.0

TABLE A.56 - SWA/NAMIBIA'S SHARE IN WORLD PRODUCTION OF SELECTED MINERALS

MINERAL	UNIT	1976	1977	1978	1979	1980	1981	1982	1983
CADMIUM:									
SWA/Namibia	Tonnes	83	88	79	81	69	-	110	51
World	Tonnes	16,998	18,250	17,332	18,679	18,231	17,364	16,452	17,244
SWA/Namibia-share	%	0.49%	0.48%	0.46%	0.43%	0.38%	0.00%	0.67%	0.30%
SMELTER COPPER:									
SWA/Namibia	Tonnes	36	53	47	43	40	40	51	54
World	Tonnes	6,860	7,096	7,487	7,487	7,525	7,925	7,743	7,972
SWA/Namibia-share	%	0.53%	0.75%	0.62%	0.57%	0.53%	0.50%	0.65%	0.68%
SMELTER LEAD:									
SWA/Namibia	Tonnes	40	43	40	42	43	42	41	35
World	Tonnes	3,237	3,227	3,144	3,275	3,171	3,107	3,162	3,209
SWA/Namibia-share	%	1.22%	1.32%	1.26%	1.27%	1.35%	1.34%	1.28%	1.10%
LITHIUM:									
SWA/Namibia	Tonnes	1,499	826	1,687	1,040	881	1,292	792	792
Major producers	Tonnes	70,584	73,597	83,621	76,974	93,675	90,214	83,454	80,476
SWA/Namibia-share	%	2.12%	1.12%	2.02%	1.35%	0.94%	1.43%	0.95%	0.98%
SALT:									
SWA/Namibia	'000 t	250	219	201	208	217	193	187	155
World	'000 t	160,667	160,846	168,449	173,315	168,855	171,356	165,032	165,721
SWA/Namibia-share	%	0.16%	0.14%	0.12%	0.12%	0.13%	0.11%	0.11%	0.09%
SILVER:									
SWA/Namibia	Tonnes	33	44	120	119	76	108	86	91
World	Tonnes	9,830	10,575	10,850	10,834	10,672	11,253	11,935	12,131
SWA/Namibia-share	%	0.33%	0.41%	1.11%	1.10%	0.71%	0.96%	0.72%	0.75%
TIN:									
SWA/Namibia	Tonnes	1,179	1,319	1,293	1,307	1,208	1,228	1,326	1,384
World	Tonnes	217,612	229,226	239,858	244,252	246,230	251,885	235,850	210,220
SWA/Namibia-share	%	0.54%	0.58%	0.54%	0.54%	0.49%	0.49%	0.56%	0.66%
ZINC (ORE CONTENT):									
SWA/Namibia	Tonnes	47.6	40.2	52.2	42.6	33.7	37.4	34.8	31.2
World	Tonnes	5,698.2	5,906.9	5,869.8	5,962.1	5,929.7	5,818.6	6,205.8	6,212.4
SWA/Namibia-share	%	0.84%	0.68%	0.89%	0.71%	0.57%	0.64%	0.56%	0.50%
ARSENIC:									
SWA/Namibia	Tonnes	5,122	2,615	2,401	2,221	1,288	1,370	1,895	1,126
World	Tonnes	38,675	31,277	30,818	29,620	28,619	27,872	26,264	25,276
SWA/Namibia-share	%	13.24%	8.36%	7.79%	7.50%	4.50%	4.92%	7.22%	4.45%
DIAMONDS:									
SWA/Namibia	'000 ca	1,694	2,002	1,899	1,653	1,560	1,251	1,017	968
World	'000 ca	38,881	39,339	39,292	39,624	39,430	43,877	42,560	44,370
SWA/Namibia-share	%	4.36%	5.09%	4.83%	4.17%	3.96%	2.85%	2.39%	2.18%
GEM DIAMONDS ONLY:									
SWA/Namibia	'000 ca	1,508	1,872	1,829	1,618	1,528	1,215	1,009	963
World	'000 ca	9,178	10,045	9,487	10,283	10,672	10,480	10,428	21,085
SWA/Namibia-share	%	16.43%	18.63%	19.28%	15.73%	14.32%	11.59%	9.68%	4.57%
URANIUM (ORE CONTENT):									
SWA/Namibia	Tonnes	654	2,339	2,697	3,770	4,038	3,970	3,777	3,719
Western World	Tonnes	23,040	28,852	33,915	38,660	43,428	43,962	41,329	36,426
SWA/Namibia-share	%	2.84%	8.11%	7.95%	9.75%	9.30%	9.03%	9.14%	10.21%

TABLE A.57 - VALUE ADDED (AT MARKET PRICES) ORIGINATING DIRECTLY AND INDIRECTLY FROM MINING - R million

YEAR	DIRECT VALUE ADDED	INDIRECT VALUE ADDED RESULTING FROM: CURRENT OUTLAYS	CAPITAL OUTLAYS	SUB-TOTAL	TOTAL VALUE ADDED	TOTAL G D P	PRIVATE SECTOR VALUE ADDED *	TOTAL VALUE ADDED AS % OF GDP	INDIRECT VALUE ADDED AS % OF PRIVATE VALUE ADDED *
1950	18.5	2.9	0.9	3.8	22.3	59.0	37.3	37.8	10.2
1951	31.2	2.6	0.9	3.5	34.7	80.7	46.1	43.0	7.6
1952	34.7	3.1	1.8	4.9	39.6	89.4	50.5	44.3	9.7
1953	35.2	4.1	1.9	6.0	41.2	97.6	57.3	42.2	10.5
1954	37.0	4.1	1.5	5.6	42.6	106.9	63.9	39.9	8.8
1955	52.5	5.0	0.6	5.6	58.1	130.6	71.6	44.5	7.8
1956	63.6	5.6	0.6	6.2	69.8	142.6	71.8	48.9	8.6
1957	54.6	6.3	0.8	7.1	61.7	138.6	76.6	44.5	9.3
1958	46.3	5.4	1.2	6.6	52.9	130.5	76.1	40.5	8.7
1959	51.2	7.1	0.7	7.8	59.0	127.5	67.9	46.3	11.5
1960	43.2	4.9	0.9	5.8	49.0	122.2	70.2	40.1	8.3
1961	47.1	3.5	2.5	6.0	53.1	159.3	102.4	33.3	5.9
1962	51.5	6.5	3.6	10.1	61.6	169.1	106.9	36.4	9.4
1963	62.1	3.1	2.7	5.8	67.9	198.9	125.1	34.1	4.6
1964	89.6	4.8	2.2	7.0	96.6	233.7	131.7	41.3	5.3
1965	100.4	8.2	2.5	10.7	111.1	259.8	144.4	42.8	7.4
1966	125.8	9.4	2.4	11.8	137.6	291.8	148.4	47.2	8.0
1967	124.5	5.3	2.2	7.5	132.0	306.5	162.5	43.1	4.6
1968	125.1	8.5	3.1	11.6	136.7	340.2	191.7	40.2	6.1
1969	127.1	10.5	3.0	13.5	140.6	356.9	204.3	39.4	6.6
1970	110.4	11.2	3.6	14.8	125.2	359.5	218.5	34.8	6.8
1971	92.4	11.3	1.6	12.9	105.3	368.7	240.4	28.6	5.4
1972	122.8	15.1	2.8	17.9	140.7	439.9	276.0	32.0	6.5
1973	202.0	16.6	3.6	20.2	222.2	573.3	324.3	38.8	6.2
1974	183.8	31.1	13.3	44.4	228.2	609.7	372.3	37.4	11.9
1975	187.8	30.1	33.3	63.4	251.2	690.4	444.5	36.4	14.3
1976	238.2	48.2	22.6	70.8	309.0	825.4	521.3	37.4	13.6
1977	410.5	89.3	16.1	105.4	515.9	1028.4	543.4	50.2	19.4
1978	582.3	58.1	20.7	78.8	661.1	1240.0	566.0	53.3	13.9
1979	633.5	93.4	10.1	103.5	737.0	1390.9	654.2	53.0	15.8
1980	681.9	108.3	23.8	132.1	814.0	1526.5	705.8	53.3	18.7
1981	481.6	101.7	15.8	117.5	599.1	1559.5	850.8	38.4	13.8
1982	491.1	112.4	10.1	122.5	613.6	1778.8	971.4	34.5	12.6
1983	503.5	98.8	9.3	108.1	611.6	1859.0	987.2	32.9	11.0
1984	536.8	151.5	7.7	159.2	696.0	2090.5	1123.6	33.3	14.2
1985	954.3	156.9	5.8	162.7	1117.0	2732.0	1307.8	40.9	12.4

* EXCLUDING MINING SECTOR

TABLE A.58 - MINING'S CONTRIBUTION TO GROSS DOMESTIC PRODUCT - 1920 TO 1950

YEAR	R MILLIONS		MINING'S PERCENTAGE CONTRIBUTION TO THE GDP
	TOTAL GDP	VALUE ADDED BY MINING	
1920	13.0	7.6	58.5
1921	5.8	2.0	34.5
1922	6.4	2.2	34.4
1923	8.8	4.5	51.1
1924	9.0	4.1	45.6
1925	10.6	5.1	48.1
1926	11.4	5.0	43.9
1927	12.4	5.7	46.0
1928	12.6	4.1	32.5
1929	13.0	5.3	40.8
1930	9.8	4.3	43.9
1931	6.6	1.4	21.2
1932	5.4	0.4	7.4
1933	3.8	0.0	0.0
1934	5.4	-0.1	-1.9
1935	8.4	1.0	11.9
1936	10.6	1.9	17.9
1937	12.6	2.3	18.3
1938	14.4	3.7	25.7
1939	13.0	1.4	10.8
1940	10.4	0.4	3.8
1941	13.4	1.0	7.5
1942	12.2	0.7	5.7
1943	18.4	1.7	9.2
1944	19.8	2.2	11.1
1945	19.8	2.5	12.6
1946	21.8	3.3	15.1
1947	30.4	4.7	15.5
1948	38.8	8.4	21.6
1949	41.8	11.1	26.6
1950	55.2	17.3	31.3

TABLE A.59 - MINERAL EXPORTS AS PERCENTAGE OF MERCHANDISE EXPORTS - 1920 TO 1950

YEAR	R MILLIONS				% SHARE IN TOTAL EXPORTS		
	DIAMONDS	OTHER MINERALS	ALL MINERALS	TOTAL EXPORTS	DIAMONDS	OTHER MINERALS	ALL MINERALS
1920	3.2	1.4	4.6	5.4	59.3	25.7	84.9
1921	1.0	0.9	1.9	2.6	37.9	33.8	71.8
1922	1.6	0.9	2.5	3.4	46.5	26.5	73.0
1923	3.3	1.2	4.6	6.0	55.2	20.6	75.8
1924	2.2	1.5	3.7	5.6	39.8	27.0	66.8
1925	3.8	1.5	5.3	7.0	54.0	21.7	75.7
1926	4.0	1.3	5.3	7.2	55.6	17.9	73.5
1927	3.2	1.3	4.5	6.8	47.7	18.6	66.3
1928	2.8	1.6	4.4	7.2	38.6	22.3	60.9
1929	3.2	2.1	5.3	7.4	43.7	27.9	71.6
1930	1.3	1.3	2.6	4.2	30.5	31.5	62.0
1931	0.6	0.7	1.3	3.2	18.8	23.1	41.8
1932	0.4	0.3	0.7	2.6	16.2	10.2	26.4
1933	0.1	0.2	0.3	3.2	3.6	5.6	9.2
1934	0.9	0.2	1.1	3.2	28.1	6.4	34.4
1935	1.1	0.5	1.6	5.2	20.7	9.8	30.5
1936	1.8	0.6	2.4	6.4	28.6	9.3	37.9
1937	2.2	1.0	3.2	7.8	28.2	12.4	40.6
1938	0.6	1.4	2.0	6.2	9.2	23.2	32.4
1939	0.5	0.9	1.5	6.6	8.2	14.1	22.3
1940	1.1	0.9	2.0	7.6	14.1	11.6	25.7
1941	1.6	0.5	2.1	10.6	15.5	4.5	20.1
1942	1.6	0.8	2.4	9.0	17.3	9.0	26.3
1943	1.4	1.0	2.4	13.8	10.3	7.0	17.4
1944	1.8	0.4	2.3	14.8	12.4	2.9	15.2
1945	2.1	0.4	2.5	16.8	12.7	2.3	15.0
1946	3.0	0.4	3.3	20.4	14.5	1.9	16.4
1947	3.9	2.2	6.1	19.0	20.6	11.6	32.2
1948	5.0	5.3	10.3	26.0	19.0	20.5	39.5
1949	6.4	7.8	14.2	30.6	21.0	25.3	46.4
1950	11.7	9.2	20.9	41.6	28.1	22.2	50.2

TABLE A.60 - MINING TAXES AND TOTAL TAXES PAID

YEAR	R millions											
	DIRECT TAXES PAID				INDIRECT TAXES PAID				DIRECT AND INDIRECT TAXES PAID			
	DIAMOND MINING	NON-DIAMOND MINING	TOTAL MINING	TOTAL DIRECT TAXES	DIAMOND MINING	NON-DIAMOND MINING	TOTAL MINING	TOTAL INDIRECT TAXES	DIAMOND MINING	NON-DIAMOND MINING	TOTAL MINING	TOTAL TAXES
1970	27.2	8.9	36.1	54.1	6.9	0.5	7.4	28.7	34.1	9.4	43.5	82.8
1971	23.6	10.3	33.9	54.9	7.7	0.6	8.3	33.9	31.3	10.9	42.2	88.8
1972	14.9	3.5	18.4	35.6	9.5	0.6	10.1	35.9	24.4	4.1	28.5	71.5
1973	34.8	2.6	37.4	62.2	14.9	0.7	15.6	46.2	49.7	3.3	53.0	108.4
1974	61.1	7.7	68.8	103.0	13.9	0.8	14.7	46.0	75.0	8.5	83.5	149.0
1975	32.8	7.1	39.9	90.9	12.7	0.9	13.6	50.1	45.5	8.0	53.5	141.0
1976	30.8	0.9	31.7	86.4	21.9	1.2	23.1	73.6	52.7	2.1	54.8	160.0
1977	39.7	0.2	39.9	113.5	20.2	1.5	21.7	81.9	59.9	1.7	61.6	195.4
1978	126.6	1.0	127.6	196.6	49.3	1.7	51.0	119.6	175.9	2.7	178.6	316.2
1979	144.1	6.1	150.2	223.3	47.1	2.1	49.2	136.4	191.2	8.2	199.4	359.7
1980	103.0	16.5	119.5	236.9	49.8	2.1	51.9	137.5	152.8	18.6	171.4	374.4
1981	55.6	4.5	60.1	109.1	24.3	2.9	27.2	145.4	79.9	7.4	87.3	254.5
1982	26.9	0.3	27.2	119.5	22.5	3.5	26.0	172.4	49.4	3.8	53.2	291.9
1983	21.0	2.7	23.7	127.8	26.3	3.9	30.2	183.7	47.3	6.6	53.9	311.5
1984	36.4	70.3	106.7	228.3	23.2	3.2	26.4	209.4	59.6	73.5	133.1	437.7
1985	42.9	78.2	121.1	296.6	41.7	4.5	46.2	272.4	84.6	82.7	167.3	569.0
TOTAL	821.4	220.8	1042.2	2138.7	391.9	30.7	422.6	1773.1	1213.3	251.5	1464.8	3911.8
	TAXES PAID BY MINING AS PERCENTAGE OF TOTAL TAXES PAID											
1970	50.3	16.5	66.7	100.0	24.0	1.7	25.8	100.0	41.2	11.4	52.5	100.0
1971	43.0	18.8	61.7	100.0	22.7	1.8	24.5	100.0	35.2	12.3	47.5	100.0
1972	41.9	9.8	51.7	100.0	26.5	1.7	28.1	100.0	34.1	5.7	39.9	100.0
1973	55.9	4.2	60.1	100.0	32.3	1.5	33.8	100.0	45.8	3.0	48.9	100.0
1974	59.3	7.5	66.8	100.0	30.2	1.7	32.0	100.0	50.3	5.7	56.0	100.0
1975	36.1	7.8	43.9	100.0	25.3	1.8	27.1	100.0	32.3	5.7	37.9	100.0
1976	35.6	1.0	36.7	100.0	29.8	1.6	31.4	100.0	32.9	1.3	34.3	100.0
1977	35.0	0.2	35.2	100.0	24.7	1.8	26.5	100.0	30.7	0.9	31.5	100.0
1978	64.4	0.5	64.9	100.0	41.2	1.4	42.6	100.0	55.6	0.9	56.5	100.0
1979	64.5	2.7	67.3	100.0	34.5	1.5	36.1	100.0	53.2	2.3	55.4	100.0
1980	43.5	7.0	50.4	100.0	36.2	1.5	37.7	100.0	40.8	5.0	45.8	100.0
1981	51.0	4.1	55.1	100.0	16.7	2.0	18.7	100.0	31.4	2.9	34.3	100.0
1982	22.5	0.3	22.8	100.0	13.1	2.0	15.1	100.0	16.9	1.3	18.2	100.0
1983	16.4	2.1	18.5	100.0	14.3	2.1	16.4	100.0	15.2	2.1	17.3	100.0
1984	15.9	30.8	46.7	100.0	11.1	1.5	12.6	100.0	13.6	16.8	30.4	100.0
1985	14.5	26.4	40.8	100.0	15.3	1.7	17.0	100.0	14.9	14.5	29.4	100.0
AVERAGE	38.4	10.3	48.7	100.0	22.1	1.7	23.8	100.0	31.0	6.4	37.4	100.0

TABLE A.61 - CONTRIBUTION OF MINING TO REMUNERATION OF EMPLOYEES

YEAR	REMUNERATION OF EMPLOYEES (R millions)				TOTAL REMUNERATION OF EMPLOYEES (R millions)	MINING'S CONTRIBUTION TO TOTAL REMUNERATION OF EMPLOYEES (PERCENTAGE)			
	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING		DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING
1950	1.6	-	1.6	3.2	20.6	7.8	-	7.8	15.5
1951	1.9	-	2.1	4.0	25.4	7.5	-	8.3	15.7
1952	2.2	-	2.7	4.9	30.2	7.3	-	8.9	16.2
1953	3.0	-	3.1	6.1	35.3	8.5	-	8.8	17.3
1954	3.9	-	2.6	6.5	38.3	10.2	-	6.8	17.0
1955	4.3	-	3.3	7.6	43.9	9.8	-	7.5	17.3
1956	4.9	-	3.6	8.5	46.2	10.6	-	7.8	18.4
1957	4.8	-	3.7	8.5	48.5	9.9	-	7.6	17.5
1958	5.0	-	3.1	8.1	48.9	10.2	-	6.3	16.6
1959	5.3	-	2.7	8.0	50.3	10.5	-	5.4	15.9
1960	5.4	-	3.1	8.5	56.9	9.5	-	5.4	14.9
1961	5.6	-	3.5	9.1	64.5	8.7	-	5.4	14.1
1962	5.5	-	4.0	9.5	68.8	8.0	-	5.8	13.8
1963	6.5	-	4.6	11.1	77.4	8.4	-	5.9	14.3
1964	7.4	-	6.2	13.6	86.2	8.6	-	7.2	15.8
1965	8.3	-	7.4	15.7	98.7	8.4	-	7.5	15.9
1966	7.9	-	7.2	15.1	105.5	7.5	-	6.8	14.3
1967	10.8	-	9.6	20.4	119.8	9.0	-	8.0	17.0
1968	10.4	-	9.7	20.1	133.8	7.8	-	7.2	15.0
1969	10.0	-	10.1	20.1	142.7	7.0	-	7.1	14.1
1970	12.0	-	13.8	25.8	166.1	7.2	-	8.3	15.5
1971	12.2	-	17.0	29.2	185.9	6.6	-	9.1	15.7
1972	10.8	-	16.6	27.4	201.6	5.4	-	8.2	13.6
1973	14.0	0.2	17.6	31.8	227.3	6.2	0.1	7.7	14.0
1974	17.0	0.2	26.8	44.0	265.4	6.4	0.1	10.1	16.6
1975	23.4	0.3	30.8	54.5	303.4	7.7	0.1	10.2	18.0
1976	27.9	9.5	39.7	77.1	356.6	7.8	2.7	11.1	21.6
1977	32.8	18.0	50.4	101.2	410.2	8.0	4.4	12.3	24.7
1978	40.3	20.2	44.8	105.3	455.9	8.8	4.4	9.8	23.1
1979	50.2	34.1	38.2	122.5	516.5	9.7	6.6	7.4	23.7
1980	55.4	40.7	44.6	140.7	610.8	9.1	6.7	7.3	23.0
1981	62.0	47.1	54.0	163.1	800.3	7.7	5.9	6.7	20.4
1982	53.5	55.4	58.1	167.0	950.2	5.6	5.8	6.1	17.6
1983	58.7	62.7	67.7	189.1	1066.4	5.5	5.9	6.3	17.7
1984	59.9	65.0	63.2	188.1	1177.8	5.1	5.5	5.4	16.0
1985	67.8	76.0	68.9	212.7	1301.1	5.2	5.8	5.3	16.3

TABLE A.62 - SHARE OF REMUNERATION OF EMPLOYEES IN VALUE ADDED
Percentages

YEAR	MINING				TOTAL ECONOMY
	DIAMOND MINING	URANIUM MINING	OTHER MINING	TOTAL MINING	
1950	15.1	-	23.9	18.5	37.3
1951	11.8	-	15.6	13.5	33.5
1952	12.2	-	18.6	15.0	35.8
1953	16.6	-	20.8	18.5	38.5
1954	19.2	-	18.3	18.8	38.5
1955	17.8	-	13.1	15.4	35.8
1956	16.4	-	11.9	14.2	34.5
1957	17.1	-	16.1	16.7	37.4
1958	21.5	-	15.8	18.9	40.6
1959	21.4	-	11.7	16.7	43.0
1960	22.2	-	20.3	21.5	51.5
1961	19.3	-	23.6	20.8	42.9
1962	19.0	-	20.7	19.7	43.1
1963	16.8	-	24.0	19.2	41.4
1964	14.4	-	19.5	16.3	39.4
1965	13.8	-	20.8	16.4	40.3
1966	10.5	-	17.3	12.9	38.7
1967	14.2	-	24.6	17.7	42.0
1968	14.9	-	21.2	17.4	41.9
1969	13.6	-	22.2	16.9	42.7
1970	22.8	-	27.4	25.0	49.3
1971	24.6	-	49.1	34.7	54.4
1972	13.3	-	53.0	24.3	49.1
1973	10.0	-	37.8	17.1	42.5
1974	16.6	-	39.8	26.0	46.6
1975	19.1	12.5	62.5	31.3	47.1
1976	18.7	104.4	69.5	35.8	47.0
1977	12.0	38.0	74.4	26.0	43.1
1978	10.3	30.7	59.3	19.8	40.1
1979	14.5	24.5	38.7	21.0	40.5
1980	15.2	24.1	46.3	22.3	43.3
1981	33.3	25.0	67.8	35.9	55.0
1982	37.4	22.7	73.7	35.9	57.1
1983	33.6	32.9	62.7	40.0	60.6
1984	38.5	26.4	58.1	36.9	60.5
1985	20.5	16.7	56.4	23.4	51.8

TABLE A.63 - MINING'S EMPLOYMENT SHARE IN ECONOMICALLY ACTIVE POPULATION AND IN LABOUR FORCE

YEAR	TOTAL POPULATION (Numbers)	ECONOMICALLY ACTIVE POPULATION (Numbers)	TOTAL LABOUR FORCE (Numbers)	EMPLOYMENT IN MINING: TOTAL (Numbers)	EMPLOYMENT IN MINING: AS % OF ECONOMICALLY ACTIVE POPULATION	EMPLOYMENT IN MINING: AS % OF LABOUR FORCE
1950	396,200	157,688	153,489	7,654	4.9	5.0
1951	407,600	161,672	157,367	9,272	5.7	5.9
1952	419,300	165,950	161,264	10,962	6.6	6.8
1953	431,400	170,211	165,160	11,410	6.7	6.9
1954	443,800	174,561	169,057	11,666	6.7	6.9
1955	456,500	178,999	172,953	13,505	7.5	7.8
1956	469,600	183,561	176,850	13,669	7.4	7.7
1957	483,100	188,248	180,746	13,894	7.4	7.7
1958	497,000	193,057	184,643	12,572	6.5	6.8
1959	511,300	197,987	188,539	11,693	5.9	6.2
1960	526,000	203,271	192,436	11,907	5.9	6.2
1961	544,200	207,401	196,527	11,329	5.5	5.8
1962	563,100	211,851	200,618	10,737	5.1	5.4
1963	582,600	216,339	204,708	10,649	4.9	5.2
1964	602,800	220,893	208,799	12,862	5.8	6.2
1965	623,700	225,502	212,890	13,638	6.0	6.4
1966	645,400	230,193	216,981	14,785	6.4	6.8
1967	667,700	234,882	221,072	15,381	6.5	7.0
1968	690,900	239,666	225,162	15,480	6.5	6.9
1969	714,800	244,462	229,253	16,916	6.9	7.4
1970	739,600	252,875	233,344	18,258	7.2	7.8
1971	762,400	260,741	239,650	17,530	6.7	7.3
1972	785,800	267,958	245,956	15,980	6.0	6.5
1973	810,000	276,210	252,262	16,984	6.1	6.7
1974	834,900	284,701	258,568	18,512	6.5	7.2
1975	860,500	292,570	264,874	18,417	6.3	7.0
1976	887,000	301,580	271,180	19,897	6.6	7.3
1977	914,200	310,307	277,486	21,230	6.8	7.7
1978	942,300	319,440	281,706	19,269	6.0	6.8
1979	971,300	327,328	285,926	20,074	6.1	7.0
1980	1,001,200	336,158	290,146	20,183	6.0	7.0
1981	1,031,900	344,664	295,967	20,002	5.8	6.8
1982	1,064,700	354,545	296,573	17,300	4.9	5.8
1983	1,098,500	363,604	297,179	16,595	4.6	5.6
1984	1,133,400	374,022	297,784	15,624	4.2	5.2
1985	1,169,400	384,733	298,390	14,869	3.9	5.0

TABLE A.64 - INPUTS AND OUTPUTS OF TOTAL MINING AT CONSTANT 1975 PRICES - R millions

YEAR	INTER-MEDIATE INPUTS	LABOUR INPUTS	TOTAL INPUTS	TOTAL OUTPUTS	OUTPUT/INPUT RATIO	OUTPUT/INPUT INDEX (1975=100)
1962	30.6	33.6	64.2	142.0	2.2	105.7
1963	14.3	33.3	47.6	152.6	3.2	153.1
1964	21.4	39.6	61.0	207.5	3.4	162.5
1965	35.6	41.9	77.5	226.5	2.9	139.6
1966	39.8	45.4	85.2	248.5	2.9	139.3
1967	21.2	47.1	68.3	236.9	3.5	165.7
1968	32.6	47.3	79.9	220.6	2.8	131.9
1969	39.0	51.3	90.3	255.2	2.8	135.0
1970	39.7	54.7	94.4	240.9	2.6	121.9
1971	39.0	51.8	90.8	212.1	2.3	111.6
1972	48.7	46.8	95.5	212.3	2.2	106.2
1973	48.9	50.1	99.0	256.3	2.6	123.7
1974	77.6	54.6	132.2	232.5	1.8	84.0
1975	67.4	54.5	121.9	255.2	2.1	100.0
1976	94.4	57.9	152.3	257.3	1.7	80.7
1977	149.3	68.6	217.9	307.9	1.4	67.5
1978	92.0	64.1	156.1	338.7	2.2	103.6
1979	126.5	67.9	194.4	307.8	1.6	75.6
1980	132.4	67.4	199.8	297.0	1.5	71.0
1981	110.0	66.1	176.1	270.9	1.5	73.5
1982	104.0	57.9	161.9	252.7	1.6	74.6
1983	82.3	55.4	137.7	253.2	1.8	87.8
1984	115.9	52.5	168.4	244.1	1.4	69.2
1985	99.6	50.0	149.6	254.8	1.7	81.4

TABLE A.65 - DATA USED FOR ESTIMATING LABOUR PRODUCTIVITY IN MINING

YEAR	GROSS VALUE OF MINERAL PRODUCTION AT CONSTANT 1975 PRICES (R mill.) (A)	NUMBER OF EMPLOYEES (Numbers) (B)	CONSUMER PRICE INDEX (1975=100) (C)	REMUNERATION OF EMPLOYEES (R mill.) (D)	REAL OUTPUT PER EMPLOYEE		REAL REMUNERATION PER EMPLOYEE	
					(A)/(B) (Rand) (E)	INDEX (1975=100) (F)	(D)/(C)/(B) (Rand) (G)	INDEX (1975=100) (H)
1950	60.6	7,654	34.4	3.2	7917.4	56.7	1215.4	41.1
1951	65.7	9,272	37.1	4.0	7085.8	50.8	1162.8	39.3
1952	73.1	10,962	39.7	4.9	6668.5	47.8	1125.9	38.0
1953	78.4	11,410	42.0	6.1	6871.2	49.2	1272.9	43.0
1954	84.6	11,666	43.8	6.5	7251.8	52.0	1272.1	43.0
1955	104.7	13,505	46.1	7.6	7752.7	55.6	1220.7	41.3
1956	125.2	13,669	47.2	8.5	9159.4	65.6	1317.5	44.5
1957	129.8	13,894	48.9	8.5	9342.2	66.9	1251.1	42.3
1958	115.0	12,572	50.3	8.1	9147.3	65.6	1280.9	43.3
1959	116.3	11,693	51.3	8.0	9946.1	71.3	1333.7	45.1
1960	117.1	11,771	52.3	8.5	9948.2	71.3	1380.7	46.7
1961	112.3	11,329	53.0	9.1	9912.6	71.0	1515.6	51.2
1962	137.0	10,737	53.3	9.5	12759.6	91.4	1660.0	56.1
1963	170.0	10,649	53.5	11.1	15963.9	114.4	1948.3	65.8
1964	206.6	12,862	54.2	13.6	16062.8	115.1	1950.9	65.9
1965	226.2	13,638	56.4	15.7	16586.0	118.9	2041.1	69.0
1966	250.3	14,785	58.2	15.1	16929.3	121.3	1754.8	59.3
1967	213.3	15,381	60.0	20.4	13867.8	99.4	2210.5	74.7
1968	228.8	15,480	60.8	20.1	14780.4	105.9	2135.6	72.2
1969	258.1	16,916	63.0	20.1	15257.7	109.3	1886.1	63.7
1970	254.4	18,258	66.9	25.8	13933.6	99.9	2112.2	71.4
1971	235.7	17,530	70.7	29.2	13445.5	96.4	2356.0	79.6
1972	228.3	15,980	74.5	27.4	14286.6	102.4	2301.5	77.8
1973	246.2	16,984	80.4	31.8	14496.0	103.9	2328.8	78.7
1974	256.7	18,512	88.6	44.0	13866.7	99.4	2682.7	90.7
1975	257.0	18,417	100.0	54.5	13954.5	100.0	2959.2	100.0
1976	246.6	19,897	111.8	77.1	12393.8	88.8	3466.0	117.1
1977	319.0	21,230	125.8	101.2	15025.9	107.7	3789.2	128.0
1978	316.8	19,269	139.1	105.3	16440.9	117.8	3928.6	132.8
1979	302.9	20,074	157.6	122.5	15089.2	108.1	3872.1	130.8
1980	286.8	20,183	177.3	140.7	14210.0	101.8	3931.9	132.9
1981	263.2	20,002	203.5	163.1	13158.7	94.3	4007.0	135.4
1982	252.3	17,300	235.2	167.0	14583.8	104.5	4104.2	138.7
1983	249.7	16,595	263.3	189.1	15046.7	107.8	4327.8	146.2
1984	236.9	15,624	287.3	188.1	15162.6	108.7	4190.5	141.6
1985	236.7	14,869	321.6	212.7	15919.0	114.1	4448.1	150.3

TABLE A.66 - DATA USED FOR CALCULATING MARIGNAL TAX PROPENSITY OF MINING - R millions

YEAR	DIAMOND MINING Y	DIAMOND MINING T	DIAMOND MINING T*	NON-DIAMOND MINING Y	NON-DIAMOND MINING T	NON-DIAMOND MINING T*	TOTAL MINING Y	TOTAL MINING T	TOTAL MINING T*
1970	59.7	34.1	25.7	35.5	9.4	3.3	95.2	43.5	39.6
1971	58.8	31.3	25.3	15.8	10.9	-0.1	74.6	42.2	34.2
1972	102.8	24.4	43.4	12.4	4.1	-0.6	115.2	28.5	44.9
1973	168.5	49.7	70.3	25.7	3.3	1.6	194.2	53.0	65.8
1974	123.2	75.0	51.7	36.5	8.5	3.4	159.7	83.5	56.7
1975	117.4	45.5	49.4	17.4	8.0	0.2	134.8	53.5	50.1
1976	140.8	52.7	59.0	9.0	2.1	-1.2	149.8	54.8	54.1
1977	258.9	59.9	107.4	36.9	1.7	3.5	295.8	61.6	92.7
1978	397.3	175.9	164.2	66.0	2.7	8.4	463.3	178.6	137.0
1979	338.7	191.2	140.1	154.7	8.2	23.3	493.4	199.4	145.0
1980	352.3	152.8	145.7	167.6	18.6	25.5	519.9	171.4	152.0
1981	142.0	79.9	59.5	153.5	7.4	23.1	295.5	87.3	92.6
1982	101.1	49.4	42.7	195.8	3.8	30.2	296.9	53.2	93.0
1983	131.4	47.3	55.1	158.1	6.6	23.9	289.5	53.9	91.0
1984	110.6	59.6	46.6	224.3	73.5	35.0	334.9	133.1	103.0
1985	307.4	84.6	127.3	443.4	82.7	71.9	750.8	167.3	213.1

Diamond mining	Non-diamond mining	Total mining
Where: Y = Total current income before taxes. T = Direct and indirect taxes	Y = Total current income before taxes. T = Direct and indirect taxes	Y = Total current income before taxes. T = Direct and indirect taxes
T* = b + t(Y) Where: a = 1.220 t = 0.410 r = 0.879	T* = b + t(Y) b = -2.716 t = 0.168 r = 0.792	T* = c + t(Y) c = 14.425 t = 0.265 r = 0.857

TABLE A.67 - DATA USED TO ESTIMATE A WEIGHTED INDEX OF INDUSTRIAL PRODUCTION

COUNTRY	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
MINERAL EXPORTS TO MAJOR INDUSTRIAL COUNTRIES - R ' 000															
West Germany	5,614	3,695	2,004	4,802	8,048	11,015	19,013	20,988	24,595	23,736	27,874	21,795	35,411	37,061	53,228
U.S.A.	14,890	9,725	9,753	13,999	22,798	26,621	350	381	2	2	431	863	596	106	4,001
Spain	-	-	-	-	-	-	1	-	-	8,806	2,129	-	33	79	22
South Africa	8,263	8,987	10,689	16,826	29,120	26,906	28,200	27,231	32,919	45,675	48,471	46,811	40,535	33,147	48,975
Netherlands	1,006	955	655	759	125	757	4,411	857	3,666	185	243	20	175	14	29
Japan	16,370	9,232	7,592	10,157	12,463	9,282	7,994	6,274	13,742	28,152	30,487	15,132	21,792	19,195	18,046
Italy	3,803	3,481	3,459	4,725	4,145	2,666	2,619	7,351	10,189	16,455	15,738	7,613	6,130	5,834	1,159
France	90	408	56	55	87	126	2,244	1,649	11,698	393	5	14	-	-	-
Finland	355	111	151	190	2,219	138	485	-	-	-	-	-	-	-	-
United Kingdom	2,209	2,235	1,714	2,697	4,701	1,383	6,118	15,666	12,099	8,954	453	344	574	1,363	8,826
Belgium	4,009	6,052	12,745	8,908	9,195	3,941	17,482	20,155	6,617	21,326	44,159	34,030	32,749	68,984	52,841
Austria	-	-	-	-	-	-	-	-	4,862	6,754	8,036	11,154	19,907	10,816	15,468
TOTAL EXPORTS	56,609	44,881	48,818	63,118	92,901	82,835	88,917	100,552	120,389	160,438	178,026	137,776	157,902	176,599	202,595
INDEX OF MANUFACTURING PRODUCTION (1980 = 100)															
West Germany	69	70	72	77	82	83	91	92	95	100	100	98	95	96	99
U.S.A.	74	75	82	89	88	79	89	94	100	105	100	102	94	102	114
Spain	62	64	74	86	92	88	93	98	100	100	100	98	96	99	100
South Africa	65	66	68	74	79	81	81	78	83	91	100	107	104	96	100
Netherlands	77	80	82	87	90	86	93	94	96	99	100	100	98	99	105
Japan	68	68	73	85	81	72	80	84	89	96	100	101	101	105	117
Italy	70	70	73	80	84	76	86	87	88	94	100	98	95	92	95
France	74	79	83	90	93	85	94	95	96	101	100	98	97	97	98
Finland	64	65	73	78	82	79	80	79	83	92	100	103	104	107	112
United Kingdom	103	103	105	114	113	106	107	109	110	109	100	94	94	97	100
Belgium	78	80	85	91	95	86	94	94	97	102	100	98	98	100	102
Austria	66	71	77	81	85	79	85	88	91	97	100	98	97	99	104
MINERAL EXPORTS MULTIPLIED BY INDEX OF VOLUME OF MANUFACTURING PRODUCTION - R ' 000															
West Germany	3,874	2,587	1,443	3,698	6,599	9,142	17,302	19,309	23,365	23,736	27,874	21,359	33,640	35,579	52,696
U.S.A.	11,019	7,294	7,997	12,459	20,062	21,031	312	358	2	2	431	880	560	108	4,561
Spain	0	0	0	0	0	0	1	0	0	8,806	2,129	0	32	78	22
South Africa	5,371	5,931	7,269	12,451	23,005	21,794	22,842	21,240	27,323	41,564	48,471	50,088	42,156	31,821	48,975
Netherlands	775	764	537	660	113	651	4,102	806	3,519	183	243	20	172	14	30
Japan	11,132	6,278	5,542	8,633	10,095	6,683	6,395	5,270	12,230	27,026	30,487	15,283	22,010	20,155	21,114
Italy	2,662	2,437	2,525	3,780	3,482	2,026	2,252	6,395	8,966	15,468	15,738	7,461	5,824	5,367	1,101
France	67	322	46	50	81	107	2,109	1,567	11,230	397	5	14	0	0	0
Finland	227	72	110	148	1,820	109	388	0	0	0	0	0	0	0	0
United Kingdom	2,275	2,302	1,800	3,075	5,312	1,466	6,546	17,076	13,309	9,760	453	323	540	1,322	8,826
Belgium	3,127	4,842	10,833	8,106	8,735	3,389	16,433	18,946	6,418	21,753	44,159	33,349	32,094	68,984	53,898
Austria	0	0	0	0	0	0	0	0	4,424	6,551	8,036	10,931	19,310	10,708	16,087
WEIGHTED TOTAL	40,528	32,828	38,103	53,060	79,304	66,398	78,683	90,967	110,788	155,246	178,026	139,709	156,337	174,136	207,310
WEIGHTED INDEX	71.6	73.1	78.1	84.1	85.4	80.2	88.5	90.5	92.0	96.8	100.0	101.4	99.0	98.6	102.3

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